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COTTON DUST CONCENTRATES
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● Powell's new nationwide distribution points with *stocks on the spot* now provide faster deliveries to *your* plant!

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AGRICULTURAL CHEMICALS

THIS MONTH'S COVER

Two ancient kettles, typical of those used by pioneers in the superphosphate industry, present a striking contrast with modern fertilizer manufacturing methods which turn out nearly 20 million tons of fertilizer materials annually. These relics were originally used by Gustavus Ober in his Baltimore plant. The bronze tablet at the base says, "Original Kettles of a World Industry." (Photo courtesy of Davison Chemical Corporation)

JANUARY 1950
VOL. V No. 1

In This Issue:

AGRICULTURAL CHEMICALS

Subscription Rates: *One year,* $3.00; *two years,* $5.00. *Outside U. S. one year,* $4.00. *Published monthly on the* 15th *by Industry Publications, Inc. Publication office,* 123 *Market Place, Baltimore* 2, *Md. Advertising and editorial office* 254 *W.* 31*st St., New York* 1, *New York. Advertising rates made known on application. Closing date for copy—*20*th of the month previous to date of issue.*

Entered as second-class matter November 4, 1949, at the Post Office at Baltimore, Md., under the Act of March 3, 1879.

A Monthly Magazine For the Trade

•

LAWRENCE A. LONG
Editor

THOMAS MORGAN
Advertising Manager

•

THE SENSA


Advertising Age
THE NATIONAL NEWSPAPER OF MARKETING
Insecticide Sales in 100 Markets Pay for Ads First Day
DENVER—Chemical Corp. of Colorado reports "amazing results" from a series of full-page newspaper ads boosting Colorado 44, its new Chlordane insecticide. The company ran editorial-style copy in more than 100 dailies in the Rocky Mountain states, South Dakota, Texas and Oklahoma, and liquidated the cost of the advertisement in each city with the first day's sale of the product.
Total promotion cost was about $10,000. Dealers in each market were required to buy a supply of stock, ranging in value from $200 to $2,000, depending upon the type of store—thus underwriting the ad.
Results were almost instantaneous in smaller towns where the ads ran, the company said. One dealer in Greeley, Colo., sold out his supply three hours after the paper was off the press. In Boulder, another dealer sold out his stock the first day, partly the result of a ten-cent coupon offer.
Colorado 44 is marketed as a spray (5¢ per pint), as a 5% Chlordane dust (at 89¢ per package), as an outdoor spray, and as an emulsifiable concentrate. Bill Bonsib Advertising Agency directs the account.
COLORADO 44
brief
AD COST PREPAID
Full-page ads, boosting "Colorado 44" (new Chlordane insecticide) via editorial-style copy in 100 Western dailies, paid for by first day's sales. Chemical Corp. (Denver, Colo.) got dealers to underwrite ad by ordering $200 to $2,000 worth of stock. Instantaneous results in smaller towns helped to cover ad cost (about $10,000). Greeley, Colo., dealer sold his supply 3 hours after paper appeared. In Boulder (10¢ coupon used) stock was exhausted first day. "Greatest discovery since DDT" captioned copy on Chlordane action and safety.

TION OF '49

GIVES YOU A "FAIR SHAKE" in 1950

HERE ARE 4 GOOD REASONS TO BUY BEFORE THE SEASON STARTS!

- **PRICE PROTECTION**
  Buy *now*. The prices quoted will be adjusted to meet regular market prices during the selling season.
- **LOCAL STOCKS**
  Conveniently-located warehouses, near you, will maintain a complete stock of Colorado .44 insecticides, weed killers and agricultural chemicals! Fast delivery when you need it!
- **HIGH QUALITY**
  You can depend on Colorado .44 quality, for Colorado .44 chemicals are known for uniform formulations with the finest ingredients! We're expanding, and we're going to protect that reputation.
- **CONVENIENT DATING TERMS**
  Buy now—pay later, when the season is in full swing. We'll give you 60, 90 or 120 days to pay—according to your needs.

Get on the Bandwagon...

COLORADO

Buy .44

Toxaphene, Chlordane, 2,4-D, 2,4,5-T and Formulations of 2,4-D and 2,4,5-T, TCA, BHC, DDT Insecticides • Weed Killers • Agricultural Chemicals • Emulsifiable Concentrates Oil Solutions • Dusts

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DENVER 4, COLORADO

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1592 W. 12th Ave.
Denver 4, Colorado

Rush information about Colorado .44 Agricultural Chemicals and your dealer plan for advance buying for 1950!

☐ Have your salesman call.

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Address.....

City.....State.....

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In accordance with NAC policy that the Residue Tolerance Hearings are primarily a matter between growers, who must use agricultural chemicals to produce fresh fruits and vegetables, and the Food and Drug Administration, which is responsible for the safety of such production, NAC is cooperating with interested and affected groups to assist in the orderly presentation of data.

NAC is cooperating with all interested groups for the purpose of promoting sound conclusions which will permit Industry to continue its research and development, and at the same time, afford adequate protection to the consumer in the public interest.

In addition, NAC has established for members a special reporting service covering the Hearings so that members will at all times be informed of the products and crops on which evidence is presented.

Membership in NAC is a sound investment—IT PAYS!

National Agricultural Chemicals Association

. . . Formerly the AIF Association

Barr Bldg., 910 17th St., N.W. Washington 6, D. C.

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FRUIT, VEGETABLE GROWERS ENTHUSIASTIC OVER NEW PARATHION INSECTICIDES

Remarkable Results Achieved

Fruit and vegetable growers from Maine to California have given enthusiastic endorsement to the new insecticides made from THIOPHOS® Parathion, according to reports received by its developers, American Cyanamid Company.

A prominent grower of peaches in Kentucky reports his best control of curculio yet experienced, while an orchardist in the Shenandoah Valley states that after five applications of parathion his Elbertas were absolutely free of insect damage and their color was actually *improved*.

From Maine, Connecticut and upstate New York come reports of excellent control of aphids, fleabeetles and grasshoppers on potatoes and other vegetables. And the remarkable production rate of 1000-1100 lb. of clean Bermuda grass seed per acre—in fields which formerly averaged 200-300 lb.—has been credited to insect control with parathion by a grower in Arizona.

Known as "the growers' all-round insecticide", parathion is credited with remarkably high rates of kill on most of the insect types which commonly infest fruit and vegetable crops. Most growers who have used it agree that an important benefit is its high toxicity to many kinds of aphids, mites and leaf rollers which are unaffected by other modern insecticides.

Canning Companies Express Great Satisfaction with Parathion on Canning Peas

According to the secretary of a state canners' association, 681,000 pounds of parathion dust were applied to protect canning peas in his state during the 1949 growing season. The secretary reports that great satisfaction with parathion was expressed by the canning companies in replying to a state-wide questionnaire on the performance of insecticides in general.

This same source reports that a large increase in the use of parathion by the canners is expected this year—a strong testimonial to its success in canning-crop pest control.

Thiophos Parathion Insecticides made by National Manufacturers

Insecticides made from THIOPHOS Parathion are available in dust and wettable-powder formulations from these reputable manufacturers:

California Spray-Chemical Corporation, Richmond, Cal.

Chipman Chemical Company, Inc., Bound Brook, N. J.

Dow Chemical Company, Midland, Mich.

Geigy Company, Inc., New York

General Chemical Division, Allied Chemical & Dye Corp., New York

Niagara Chemical Division, Food Machinery Corporation, Middleport, New York

Pennsylvania Salt Manufacturing Company, Philadelphia, Pa.

Sherwin-Williams Company, Cleveland 1, Ohio

Stauffer Chemical Company, San Francisco and New York

Sunland Industries, Inc., Fresno, Cal.

Tobacco By-Products & Chemical Corporation, Richmond, Va.

Virginia Smelting Company, West Norfolk, Va.

Use Parathion Safely

Any insecticide toxic to insects is also hazardous to humans if used carelessly and in defiance of certain common-sense precautions.

These precautions are stated explicitly on every container of parathion insecticides. They must be read carefully and observed strictly to avoid accidents.

It is urged that work crews who are given parathion to apply be fully advised also of the necessity of observing these precautions.

Be sure to write for Growers' Manual on Parathion

AMERICAN Cyanamid COMPANY

Agricultural Chemicals Division

32-D ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Please send me Growers' Manual giving latest recommendations for using Parathion.

Name_____

Address_____

BEMIS paper bags for chemicals

As one of America's largest producers of multiwalls and other paper bags, Bemis naturally makes many types to serve varied packaging requirements.

For the chemical industry, several types of construction are produced. The paper bags most generally used are shown here.

Note the variety of the Bemis line when you are buying paper bags for chemicals. It gives you wider choice in quality bags from a single source.

Bemis

Peoria, Ill. • East Pepperell, Mass. • Mobile, Ala. • Houston, Texas
San Francisco, Calif. • Vancouver, Wash. • Wilmington, Calif.

Baltimore • Boise • Boston • Brooklyn • Buffalo • Charlotte • Chicago • Cleveland • Denver
Detroit • Indianapolis • Jacksonville, Fla. • Kansas City • Los Angeles • Louisville • Memphis
Minneapolis • New Orleans • New York City • Norfolk • Oklahoma City • Omaha • Phoenix
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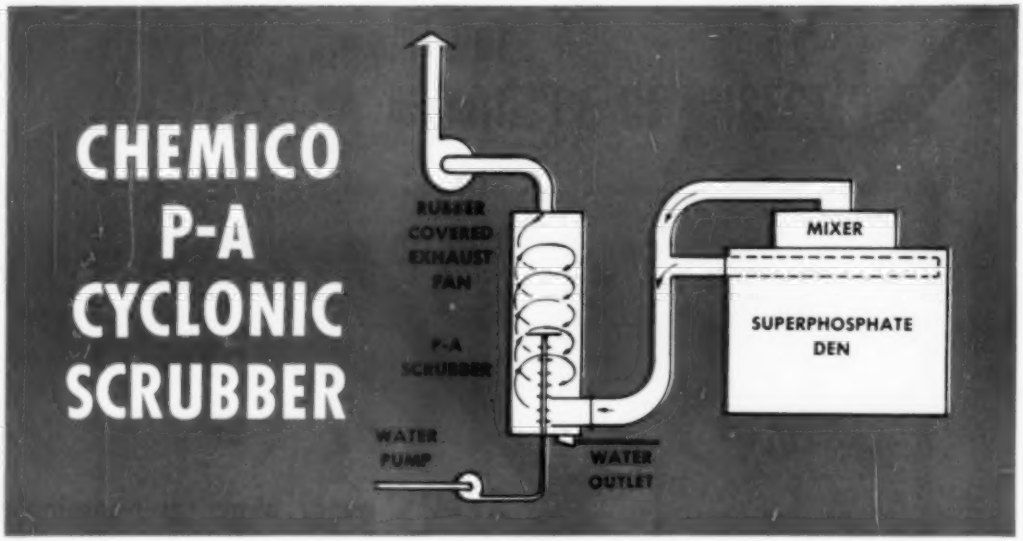
REMOVES 98% OF FLUORINE

from Superphosphate Plant Exhaust Gases



ADVANTAGES

High Efficiency—Depending on concentration, the Chemico P-A Cyclonic Scrubber removes from 96% to 98% of fluorine (SiF_4, H_2SiF_6 and HF) from Superphosphate plant exhaust gases. It makes the exhaust *invisible*.

Low Operating Cost — Consumption of water and power is low.

Low Maintenance — Its simple, trouble-free construction and full utilization of corrosion-resistant materials virtually eliminate maintenance problems.

Low Initial Cost—The Chemico P-A Cyclonic Scrubber can be installed at a surprisingly low cost.

FOR COMPLETE INFORMATION

Write Today Outlining Your Problem

P-A VENTURI SCRUBBER

For more difficult scrubbing problems CHEMICO offers the P-A Venturi Scrubber, a highly effective and economical apparatus for the removal of sub-micron dust, fume and acid mist from industrial gases.

CC 192

CHEMICAL CONSTRUCTION CORPORATION

A UNIT OF AMERICAN CYANAMID COMPANY

EMPIRE STATE BLDG., 350 FIFTH AVENUE, NEW YORK 1, N. Y.

EUROPEAN TECHNICAL REPRESENTATIVE

CYANAMID PRODUCTS LTD., BRETTENHAM HOUSE, LANCASTER PLACE, LONDON W. C. 2, ENGLAND

CABLES: CHEMICONST, NEW YORK

Chemico Plants are Profitable Investments

another product of A&S research...

The EXPENDABLE PALLET

Loaded A&S pallets being placed in freight car.

Quick Facts About A&S Expendable Pallets . . .

1. Standard fork trucks may be used, making it unnecessary to change tubular forks.
2. You can unload car in fraction of regular time.
3. No upcharge to you for palletized shipment.
4. All bags laid flat—not folded.
5. Standard pallet size is 48" x 48", about 1500—2000 bags per pallet.
6. Cores alongside fork openings prevent blocking of fork entrance in shipment.
7. All-over wrapping gives bags greater protection.
8. Regular fork trucks can handle pallets, tunnels are 26" apart.
9. Strong car bracing prevents shifting of pallets in transit.

HERE'S the most modern and up-to-date expendable pallet used by the multiwall bag industry. This expendable pallet was designed and developed at the A&S Wellsburg, West Virginia plant, and patent applications have been filed to cover its unique features.

Packed under pressure, the compact, square bag unit is completely wrapped and then strapped to the A&S Expendable pallet. Already, A&S customers are reporting noticeable savings in their bag handling and storage costs. Follow these leaders and put to profitable use the "plus" packaging features being developed in the A&S Packaging Laboratories.

ARKELL & SMITHS · 90 YEARS OF KNOW HOW · THE OLDEST NAME IN PAPER BAGS ·

ARKELL and SMITHS

CANAJOHARIE, N. Y. · WELLSBURG, W. VA. · MOBILE, ALA.

FREE

to herbicide formulators

You'll find the solutions to many specific problems in the chemical control of weeds in a series of application booklets just published by Monsanto. Any of them that is helpful in your business will be sent free upon request.

"Controlling Weeds With Chemical Sprays" is a general presentation of methods for battling noxious plants with chemicals. Other booklets deal with specific applications as shown by the titles.

Indicate the literature you want on the coupon and mail it today. Or, get in touch with the nearest Monsanto Sales Office or write: MONSANTO CHEMICAL COMPANY, Desk A, Organic Chemicals Division, 1766 South Second Street, St. Louis 4, Missouri.

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MONSANTO HERBICIDAL CHEMICALS
2,4-D ACID
2,4-D SODIUM SALT
2,4-D ISOPROPYL ESTER
2,4,5-T ACID
2,4,5-T ISOPROPYL ESTER
SANTOBRITE* (Sodium Pentachlorophenate, Tech.)
SANTOPHEN* 20 (Pentachlorophenol, Tech.)
ISOPROPYL N-PHENYL CARBAMATE

MONSANTO INSECTICIDAL CHEMICALS
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SANTOBANE* (DDT)
SANTOCHLOR* (para-Dichlorobenzene)
SANTOPHEN 20 (Pentachlorophenol, Tech.)
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NIPOS*-T (Tetraethyl Pyrophosphate, Tech. For agricultural use only)
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*Reg. U. S. Pat. Off.

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CHEMICALS AND PLASTICS

MONSANTO CHEMICAL COMPANY
Desk A, Organic Chemicals Division
1766 South Second Street, St. Louis 4, Missouri

Please send, without cost or obligation, literature checked. ..... "Controlling Weeds With Chemical Sprays." Folders on weed control: .... along right of ways; .... in small grains; .... in orchards and vineyards.

Name..... *Title*.....
Company.....
Street.....
City..... *Zone*..... *State*.....

SERVING INDUSTRY . . . WHICH SERVES MANKIND

They may not grow 'em quite as big as these but they're sure to get fine quality when they use . . .

Sul-Po-Mag®
Water-Soluble
Double Sulfate of Potash-Magnesia

If your farm customers are growing potatoes on magnesia-deficient soil, they can expect to get earlier maturity, healthier growth, larger yield and finer quality when you supply them fertilizer containing *Sul-Po-Mag*.

Experience proves it. Experimental Stations and farmers both report results like this when they used *Sul-Po-Mag* in growing potatoes, and tobacco, cotton, fruit, vegetables and other crops.

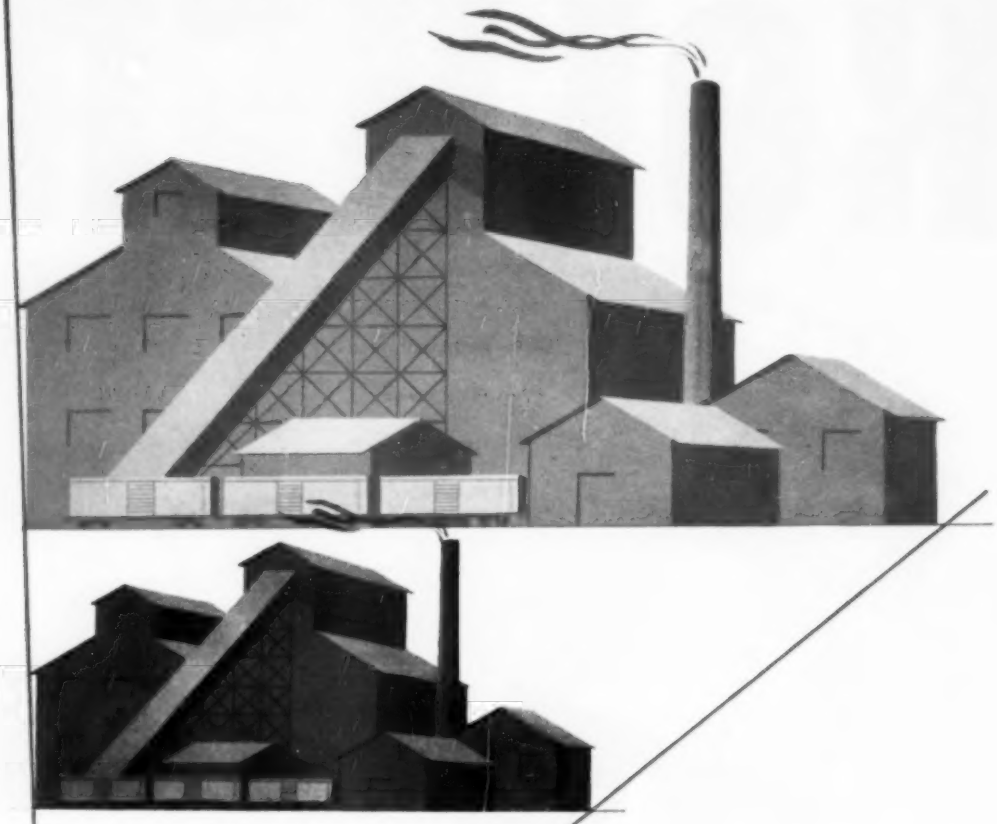
Sul-Po-Mag supplies both potash and magnesia in a properly balanced natural combination; both the potash and magnesia are in water-soluble form and are quickly available to crops. It is the most practical and economical way for the farmer to get the effective balance of elements required to meet magnesia-deficient soil conditions.

Sul-Po-Mag is produced exclusively by International at Carlsbad, New Mexico, and is advertised regularly in farm papers. You'll find that farmers will *welcome* fertilizer made with *Sul-Po-Mag*.

SUL-PO-MAG (Water-Soluble Double Sulfate of Potash-Magnesia)
MURIATE OF POTASH • SULFATE OF POTASH

POTASH DIVISION • INTERNATIONAL MINERALS & CHEMICAL International Minerals & Chemical **CORPORATION**
GENERAL OFFICES: 20 NORTH WACKER DRIVE, CHICAGO 6

more toxaphene for 1950



To meet the continually increasing demand for toxaphene (chlorinated camphene 67-69% Cl), Hercules has greatly expanded its production facilities at Brunswick, Georgia.

We urge insecticide manufacturers to place their orders early, so that production and distribution may be scheduled to meet requirements as they arise throughout the season.

HERCULES POWDER COMPANY
INCORPORATED
970 Market Street, Wilmington 99, Delaware

MAKERS OF TECHNICAL TOXAPHENE FOR AGRICULTURAL INSECTICIDES

NX50-2

THE EDITOR COMMENTS

COMPETITION is a great thing in most respects, probably the single strongest protective influence for the buyer. Without it, nobody needs to explain what can and has happened. We all know. But, sometimes competition between suppliers can become too keen, too destructive for the ultimate good of the buyer. Weak supply units cannot stand the pace,—and drop out of the picture. Temporary benefits which the buyer may enjoy soon vanish into thin air. Surviving strong units undertake to make up previous losses suffered during the heat of the competitive dog fight, and the buyer pays. The story is as old as the hills.

Right now, in agricultural chemicals, particularly in some of the weed control materials and well as certain insecticides, a tendency to cut prices below safe levels has been noted. Danger exists in the fact that most units, both basic producers and subsequent processors, cannot make a profit under these conditions. And the danger extends also to the ultimate consumer of the finished products. For his temporary benefits today, he may pay dearly later. Also, the likelihood of product sophistication is great when profits are conspicuous by their absence.

If total sales could be increased by strong price cuts, future benefits might accrue., But, in the case of insecticides, fungicides and herbicides, we question that taking a loss on sales, whether it be manufacturer, processor or dealer, can do anybody good. Stable sources of supply and stable prices benefit everybody in the long run, consumer included.

FERTILIZER buyers in cotton growing areas are being urged by the National Cotton Council to insist upon getting fertilizer in cotton bags. The object, of course, is to promote the use of cotton. But, we feel that the idea is basically faulty and could have unfavorable repercussions as has been the case with many of these reciprocal schemes over the years. Extended, such a plan has almost endless possibilities which might involve an equal number of complicated side issues. It is not as simple, direct and practical as it appears at first glance.

Cotton bags have points of superiority for many purposes and we do not feel that any commercial blackjack is needed to sell them. By suggesting pressure on fertilizer manufacturers, the National Cotton Council infers a competitive inferiority for its product which we do not believe exists. In the long run, we feel that such pressure will be futile. The suitability of the package for its product will determine the issue. The most serviceable and economical sack for any purpose, whether the buyer is interested or not in producing the material from which the sack is fabricated, is bound to be the practical end-point of any such controversy.

Although we admire the fighting efforts of the National Cotton Council to promote the use of cotton, we feel in this instance that it could invite retaliation, and the bad results over a period of time might well outnumber the good. The plan could become a boomerang.

HOLD your hat, Mr. Fertilizer Manufacturer! Louis Bromfield will burst forth with a new book in the Spring, not a volume on love and romance, but another one on farming. It will be entitled "Out of The Earth," and according to one of his stooges "will be strictly a technical tome on farming" in which Mr. Bromfield will "arise full-panoplied and unabashed in his role as the savior of his country's soil." Whatever that may mean in plain English, it should have added that Mr. Bromfield is the self-appointed "savior of his country's soil."

Ever since Louis Bromfield undertook to operate his over-publicized farming venture out in Ohio, he obviously has fancied himself an authority on crops and the soil. He has made no bones about his antipathy for "chemical fertilizers" and chemical everything else. That his recorded methods differ quite widely from

those used by practical farm operators who really produce the food to supply the nation, and from the recommendations of experiment station and other agricultural experts, apparently matters not to Mr. B. He is determined, it seems, to write on farming, and this time he says it will not be one of his best-seller things, but strictly "straight stuff on good farm practice."

Whether Mr. Bromfield is qualified to write on "good farm practice" could be a moot question. Nevertheless, we eagerly await the word of this agricultural seer. We wonder if he will tell us how to work a few thousand acres of row crops *sans* chemical fertilizers and with only natural manures. Maybe he will tell us also where to get the manures. We can hardly wait!

Buy it Now!

MANUFACTURERS are not magicians! Sudden and heavy orders arriving simultaneously from many directions cannot be filled over night. Manufacturing, packing and shipping take time. No magic wand can double or triple plant capacity at the height of the producing season to suit the whims of those who order today and expect delivery yesterday. The manufacturer must know in advance to a great degree what to expect in the way of demand or he cannot be prepared to meet it.

Delayed deliveries last summer of fertilizers, insecticides, fungicides, et al, and their raw materials, when demand suddenly balooned, should act as an automatic warning for 1950. But will it? The same thing has happened time and again in previous years, and yet those who are hung up without supplies, often with a considerable loss in business, never seem to heed the warning.

In the manufacture and distribution of agricultural chemicals, there are many unavoidable bottle necks. They require that needs be anticipated or serious disappointment in deliveries is inevitable. But if the grower refuses to commit himself in advance, how can the distributor order from the manufacturer, or how can the latter order raw materials? This, of course, is strictly the option of the dealer, distributor, or manufacturer. If each flatly refuses to estimate his market or to prepare in advance,—refuses to carry the necessary stocks to meet a sudden demand, then any resulting lost business is strictly up to him. Last summer furnished a shining example of this, in our opinion a policy of complete shortsightedness.

January is already upon us. The 1950 consuming season will be here before we know it. The time to order anything in the agricultural chemical line, not already ordered, is now,—*right now!* Strikes or no strikes, orders on suppliers' books at least will assure the earliest delivery possible. But those who wait, and wait, and wait "to see what is going to happen," are bound to get it squarely in the neck again four or five months hence. T'was ever thus, and it will be again this year!

Guest Editorial written especially for this issue of Agricultural Chemicals.

Looking Back and Ahead in the Fertilizer Field 1850-1950

By

Vincent Sauchelli

Davison Chemical Corp.
Baltimore, Md.

TWO dates are of historical interest to the fertilizer industry; one 1840, the other 1850. The former date is associated with the publication of a remarkable book, "Organic Chemistry in its Applications to Agriculture and Physiology" by Justus von Liebig, and marks the birth of agricultural science. This book gave the first reasonable interpretation of the interrelations of soil minerals, animal manures, light, air and moisture. Liebig was the first to show the feasibility of supplying calcium and phosphorus to growing plants as quickly-available nutrients, by treating insoluble mineral phosphates or bone with sulfuric acid. The event in 1850, whose centennial is celebrated this year, is the birth of the first commercial chemical mixed fertilizer, produced by William Davison* and P. S. Chappell in Baltimore, Md. Fertilizer manufacture and agricultural science were thus born about the same time.

Following closely upon the production of "super-phosphate" in England by John Bennett Lawes in 1842, the production of the first chemical "complete" fertilizer in Baltimore marked the beginning of what was to evolve into one of the most important industries of the world. Ever since then, complete mixed fertilizers comprising varying ratios of nitrogen, phosphoric acid and potash have dominated in the American market. It seems fitting and proper for the fertilizer industry to pause a bit on this 100th anniversary, consider how well it has served, and do a little crystal gazing about the years ahead.

One thing stands out clearly in retrospect; namely, that fertilizer usage is closely bound with the pattern of land use. The history of fertilizer growth and consumption reflects the system of farming prevalent in the communities it serves. This is seen in the fertilizer use pattern developed in Europe with its abundant labor and scarce land and the pattern in our country, especially in the South, with cash row-crops and scarce labor. The fertilizer industry

* William Davison founded the company in 1826 which is now The Davison Chemical Corporation in Baltimore, Md.

(*Please turn the page*)

and agriculture constitute a close business partnership: no closer business partnership exists. In fact, the industry is a definite part of agriculture. The farmer's problems are the industry's problems. His purchasing power tells us the extent to which he may buy what the industry produces.

In the early period of its history, fertilizer usage in the United States developed more extensively in the South and along the Eastern Seaboard. In the South, farming was cursed with soil-destroying systems forced upon the region by a social and economic situation that permitted no choice. The Civil War created economic pressures which, coupled with a scarcity of scientific knowledge, resulted in a downward spiral of soil productivity and farm prosperity. Now, in those same areas, soil conservation programs are being extensively promoted and fertilizer is used increasingly for producing maximum yields while maintaining soil productivity at a restored high level.

The Congress of the United States in 1887 passed the so-called Hatch Act which established agricultural experiment stations in each state to supplement the service of the land grant colleges. That date is significant, since it marks the beginning of scientific investigations which led to a more intelligent use of plant food as a tool in the production of food and fiber crops. From then on, soil management practices and fertilizer usage began to move in the pattern of proven organized common sense and to lose some of their traditional mysticism.

Much inertia must be overcome in any industry when attempts are made to convert it completely to the adoption of scientific methods. That is particularly true of the agricultural industry which is so much older than modern science. Agriculture and the fertilizer industry have suffered from a legacy of rule-of-thumb methodology and the tendency to cherish and place an exaggerated importance upon the traditions which built them up. Where this attitude prevails, radical, sweeping changes in processes, no matter how well sponsored, must be introduced gradually, as a rule. Further, the lines along which any industry has developed through the years, will naturally tend to influence the lines along which subsequent investigations are likely to be pursued. That is to say, such investigations generally will be undertaken on restricted lines with a restricted point-of-view which is bound to hamper the research.

The most outstanding advances in knowledge in our generation have been those which have not merely improved what we had, but which have gone ahead with ideas that were *completely different*. Because agriculture is one of the oldest industries, built up on ancient, cherished traditions, all attempts at innovation are met with greater resistance than in younger industries. So many practices in agriculture are rooted in the pre-science era. Consequently much of the earlier agricultural research was colored by an exaggerated deference to the past. And this holds good for some current work, too.

An ideal way to investigate in the true spirit of research, boldly and unhampered by preconceived ideas or traditions, would be to organize a team of scientists—chemists, biologists, geneticists, physicists, economists and engineers—men who know nothing about the old standards or canons of good husbandry, and send them to some area of the world that has never been cultivated to start out on a strictly scientific basis. We could instruct them to use their scientific knowledge and trained judgment in establishing their own practices of good husbandry, rotations and other methods on the basis of exact experimentation. Such a mission would reflect our complete faith in the scientific method. Science means changing, moving onwards, ever-creating. The genius of science is creativeness; without it, there is no science.

Organics vs. Inorganics

FOR many years commercial fertilizers were unacceptable to numerous farmers who maintained that since this type of fertilizer is not "natural," it could not possibly replace animal manures. Organic materials were considered superior sources of plant nutrients despite the mounting agronomic evidence of long-time experiment station test plots that chemical plant nutrients have a positive value both in crop production and in maintaining soil productivity. Even at the present time, there are in existence cults which denounce the use of chemical fertilizers, insisting upon the universal employment of manures, composts and "natural" materials. But, such opposition notwithstanding, chemical fertilizers are being used increasingly in all countries of the world as an indispensable aid in growing more food and fiber. Organic matter and humus, recognized by the industry as complementary to chemical plant nutrients, are provided more economically through good soil management than by inclusion in mixed fertilizers.

Many Changes Seen

BECAUSE research is a powerful agency of change in the modern world, it is reasonable to expect that changes will come more rapidly in the future than in the past. Mechanization of the farm, with increasing emphasis on the lower unit cost of production, permits a more intensive working of fewer acres of better land. This results in higher yields per acre and a sharp increase in output per man. The net effect is being reflected in new patterns of fertilizer usage, as well as in types of fertilizer. Just as the type of fertilizer used in the old days of oxen, mule and horse power, was bulky, had sluggish flowing properties and was of low plant food content, so the present types of fertilizer are geared to faster-moving tractor-drawn equipment. The trend is toward concentrated, high-analysis, free-drilling fertilizers of the granulated type.

Despite the claims of some critics, the fertilizer industry has improved steadily both its processes and products in accordance with the needs of its customers. Because of its intimate relationship with agriculture, its progress is more or less governed by farm demand. It is known, of course, that some critics hold that the industry

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Birmingham meeting discusses entire cotton pest problem . . . committee presents report of earlier meeting at Jackson, Miss. giving

1950 Recommendations for Cotton Insecticides

RECOMMENDATIONS for the use of insecticides in the control of [illegible] were presented at the third annual Cotton Insect Conference held at Birmingham, Alabama, December 19 & 20. The meeting was sponsored by the National Cotton Council in cooperation with farm organizations, land grant colleges, vocational agriculture, the U. S. Department of Agriculture and the National Agricultural Chemicals Association. Hosts were Alabama Polytechnic Institute and the Alabama Farm Bureau Federation. J. D. Hayes, Huntsville, Ala., vice-president of the Alabama Farm Bureau Federation, was conference chairman. Presiding officers included J. L. Lawson and H. H. Williamson.

Speakers on the program included representatives of the U S. Department of Agriculture; of the insecticide manufacturing industry; and of Agricultural Experiment Stations in the Cotton Belt. Matters of supply, early ordering, toxicity, defoliation and problems involved in manufacturing were discussed.

"No recent year has demonstrated as clearly as 1949 the value of cotton insect control—especially boll weevil control," Dr. S. A. Rohwer, assistant chief of the Bureau of Entomology and Plant Quarantine, told the group at the opening session, as he explained how farmers who applied control measures as recommended, protected their crops and benefited materially, often in striking contrast with their neighbors who failed to carry out a sound insect control program.

"In the minds of many, however, 1949 will be remembered as a year in which the demand for insecticides exceeded the supply," he said. "This was due to a wide variety of factors," he continued, pointing out that there was uncertainty about what kind of insecticides should be used, and no one knew what would be the demand for a number of new products. Fear of hazards involved in the use of some of the new chlorinated hydrocarbon products added to the complications. Production of basic chemicals was retarded, and producers of insecticides, dealers, and farmers delayed in placing orders.

All of these factors contributed to the local shortages of specific materials that farmers wanted to use, the B.E.P.Q. official declared.

On the brighter side, he said that 1949 will also be remembered as a year of achievement in research. "When the results of research done during the year have been published and fully appraised . . . 1949 will be recognized as a period of banner accomplishments," he concluded.

Ernest Hart, president of the National Agricultural Chemicals Association named these four counts on which the "insecticide manufacturer has a keen sense of his responsibility": 1) to deliver a quality of material which will be satisfactory to the needs; 2) to assist in producing a good yield, free from injury by insects and diseases; 3) to make supplies available when needed; and 4) to deliver these products in an orderly, non-speculative businesslike manner at the lowest possible cost. He explained at the same time that insecticide manufacture was a highly technical and expensive process and adequate production and distribution could best be assured only if farmers and other agencies made known their needs well in advance of the actual appearance of insects.

Mr. Hart likened the problems of the insecticide manufacturer to those of the cotton grower, and termed the two as "partners". He said that the cotton field is a factory, just as industry processing plants are factories for production of chemical insecticides. Both operations are

seasonal, he pointed out and both cotton growers and insecticides makers must plan, invest and work practically the year around to prepare for a brief harvest season.

Difficulties faced in trying to change production plans late in the season were illustrated by comparing the manufacturer's position with that of a grower who should try late in the season to expand his cotton crop. He urged growers to buy insecticides as far ahead as possible. "When orders are not available, the prudent manufacturer shuts down his plant. That lost time is gone forever," he reminded. The manufacturer does speculate somewhat on the cotton insecticide demand, but this has definite economic limits, he reminded.

Dr. E. W. Dunnam, Stoneville, Miss., entomologist, Bureau of Entomology and Plant Quarantine, explained tests at the Stoneville station in which insecticides applied as sprays gave control over cotton insects equally as satisfactory as that achieved with dusts.

Promise of greater use of sprays was indicated in the discussion which followed, with Dr. Clay Lyle, entomologist, Mississippi State Plant Board, presiding. Taking part were Dr. S. L. Calhoun, Stoneville, entomologist, BEPQ; J. G. Watts, entomologist, South Carolina Experiment Station; R. G. Strong, entomologist, Louisiana Extension Service; Charles A. King, entomologist, Geigy Company, Inc.; and C. M. Beckham, entomologist, Georgia Experiment Station.

"What we need is an awareness of hazards and the adoption of safeguards," said Dr. F. C. Bishopp in an address on "Toxicity of Cotton Insecticides and their Harmful Effects." Dr. Bishopp mentioned: 1) possible acute or chronic poisoning to the operator, 2) possible ill effects on people in adjacent areas, 3) possible damage to the cotton crop treated, 4) injury to livestock, honey bees, aquatic life, and birds, and 5) damage to the flavor or odor of crops grown subsequently on treated crop lands.

So far as the cotton crop itself is concerned, he said, these plants have showed marked tolerance to all of the commonly used insecticides. Slight burning of well-developed plants appears to be of no importance, but certain oil solutions are likely to produce more serious burning of the plants, it was noted. Emulsions, if poorly prepared or not well distributed, may cause more or less severe foliage injury. Emulsifiable concentrates that will give stable emulsions in all sorts of water seem to be the most desirable, he continued.

Dr. Bishopp warned that excessive use of insecticides may cause the material to accumulate in the soil to cause injury to subsequent crops. Although information is lacking, it has been demonstrated that DDT and related materials may be "strikingly deleterious" to a number of crops, he reminded.

Significant results obtained when entire communities in Texas carried out a planned insect control program were described by K. P. Ewing, Waco, entomologist, BEPQ. Listed among major factors contributing to the success of the plan were: 1) new and improved chemicals, 2) more satisfactory and economical methods of application, 3) proper timing of applications, which includes systematic year-to-year early-season application of insecticides over large areas where insects are known to occur, and 4) emergency control, if, and when necessary.

"Assuring Supplies"

"Large scale pest control cannot be successfully carried on as an emergency measure. It must be considered as insurance," emphasized Lea S. Hitchner, executive secretary, National Agricultural Chemicals Association, as he urged early placing of orders for materials.

He commended the activities of the National Cotton Council on the progress it has made in urging growers to order insecticides in advance, stating that where this advice has been followed, no shortages developed. The hope was expressed that this movement will be spread over a larger area of the cotton belt.

The NACA executive requested the Federal and State agencies to coordinate and simplify their recommendations as much as possible so that all will know how to proceed. He also urged that such recommendations should remain unchanged through the growing season. Distributors, dealers and growers were urged to do "some advance thinking" about the pest problem, and to select a reliable source of supply and discuss the matter with its representative.

Particular stress was laid against overdosing, and for reading and obeying instructions on the labels, particularly in regard to hazards.

Speaking for local distributors of insecticides, George R. Williamson, Dothan, Ala., manager of the Agricultural Sulphur and Chemical Co., declared that stabilization of prices for insecticides would stimulate early buying on the part of cotton producers, dealers, jobbers, and local blenders and formulators. This, he said, would help to assure adequate supplies and adequate distribution.

Recommendations presented at the meeting consisted of a detailed conference report on cotton insect research and control which had been worked out earlier at a meeting at Jackson, Mississippi. The results summarized were expected to aid in the preparation of recommendations that may be issued by State agencies and the USDA on cotton insect control for 1950. This report supersedes the Conference Report on Cotton Insect Research and Control from the meeting held in Baton Rouge, La., Nov. 1948.

The report reviews the hazards involved in the use of many of the toxicants for cotton insect control, and emphasizes the precautions to be observed in handling them. It warns particularly that the phosphorus compounds are "extremely poisonous materials and (if used at all) must be handled with great care."

The meat of the report, however, lies in the listing of insecticides for use as cotton pest control materials for 1950. Following is the report as published:

Aldrin

This compound, referred to in the report of the Baton Rouge (1948) Conference as "Julius Hyman 118," was used extensively in experiments in Mississippi and to some extent in some other states for boll weevil control in 1949. It was effective when used as a 2.5 percent dust at the rate of 10 lbs. per acre and as a spray at the rate of 0.25 lb. per acre. Aldrin will also control the cotton fleahopper, tarnished plant bug, rapid plant bug, some species of cutworms, and thrips. In experiments to date, aphids did not build up following its use. Aldrin will not control the bollworm or red spider mites. It is compatible with all of the new organic insecticides recommended for cotton insect control.

Aldrin is very toxic to animals and is extremely hazardous to handle. It should be handled similarly to parathion until the hazards in connection with its use are better understood.

Benzene Hexachloride

BHC will control the boll weevil, cotton aphid, tarnished plant bug, rapid plant bug, cotton leafworm, thrips, southern green stink bug, garden webworm, fall armyworm, cotton fleahopper and grasshoppers. It will not control the bollworm, pink bollworm, saltmarsh caterpillar and red spider mites. For this reason, benzene hexachloride alone frequently cannot be successfully employed for over-all cotton insect control. Benzene hexachloride also kills many beneficial insects.

Benzene hexachloride at approximately one-third pound of the gamma isomer per acre (example: 10 pounds of benzene hexachloride dust containing 3 percent of the gamma isomer) is the minimum rate which has consistently given satisfactory control of the insects against which it is effective. The cotton fleahopper has been controlled with one-tenth pound of the gamma isomer per acre. The most common commercial dust formulations containing benzene hexachloride used by cotton growers for boll weevil control contain 3 percent of the gamma isomer and 5 percent of DDT. In areas where red spider mites are a problem, sulfur should be used in the mixture. The insecticide that gives the best control of the pink bollworm and also controls most of the other cotton insects that may be present in the same field is a mixture containing 10 percent of DDT, 2 percent of the gamma isomer of benzene hexachloride, and 40 percent of sulfur applied at the rate of 15 pounds per acre.

When the mixture of 5 percent DDT and 3 percent of the gamma isomer of benzene hexachloride is used, an average of 10 pounds of dust per acre is recommended for control of the boll weevil and other insects, except the bollworm. Where the bollworm is also a problem, the rate should be increased to 15 pounds per acre. Applications should usually be made at four-to-five-day intervals until the infestation is brought under control. The use of this mixture destroys natural enemies of the bollworm, and this insect may increase rapidly following a premature termination of a dust program. One application of 15 pounds of the mixture per acre may suffice for "knock out" aphid control. This mixture is also used for the control of the bollworm and is often preferred to 10 percent DDT alone due to the aphid and boll weevil control which can be expected from the mixture.

Sulfur, pyrophyllite, and non-alkaline clays and talcs have been used as satisfactory diluents for benzene hexachloride.

Benzene hexachloride applied as a low gallonage spray control led the boll weevil in field experiments conducted during 1949. It should be applied at a rate of 0.4 pound of gamma isomer per acre. Proper formulation of the emulsion concentrate is necessary to prevent foliage or plant injury.

Further research is needed concerning the accumulation of this insecticide in the soil following applications to cotton and the resultant effects on other crops. Grain sorghum, Irish potatoes, onions, barley, and cowpeas are some of the crops adversely affected by benzene hexachloride.

High temperatures, wind, and convection currents greatly reduce the effectiveness of benzene hexachloride for aphid control. Technical benzene hexachloride has an objectionable odor and is irritating to the eyes and nasal passages.

Calcium Arsenate

Calcium arsenate is an economical and effective insecticide for the control of the boll weevil and the cotton leafworm. It is used at the rate of 10 to 15 lbs. per acre for boll weevil and cotton leafworm control; and 12 to 16 lbs. per acre will control bollworms if applications are properly timed and infestations are not too heavy. It is usually used undiluted against the above insects; and when used without an aphidicide, an increase in aphid populations often results. Calcium arsenate has excellent dusting qualities and is recommended as a standard of comparison with organic insectides against the cotton insects for which it is effective.

Special or low lime calcium arsenate is compatible with organic insecticides. When this is mixed with either benzene hexachloride or parathion both the boll weevil and cotton aphid may be controlled effectively. When mixed with DDT, it is effective against the boll weevil and the bollworm.

Calcium arsenate in certain light sandy soils is injurious to some crops, especially legumes and oats. It should not be used for cotton insect control in fields where rice may be planted. Drifting of dust may injure other crops. Calcium arsenate is poisonous and should be handled carefully. Livestock should be kept out of dusted fields. Care should be taken to avoid drift when dusting near pastures, especially when airplanes are used.

Chlordane

Chlordane will control the boll weevil, cotton fleahopper, tarnished plant bug, grasshoppers and thrips. For the insects against which chlordane is effective, from 0.5 to 1.5 lbs. of the technical material per acre is required. Although it kills some weevils in squares and bolls, conflicting results were obtained regarding the practical benefit derived. In general, the results obtained with chlordane when used at a comparable dosage per acre against the boll weevil were not equal to results obtained with materials usually recommended for cotton insect control. Chlordane did not control bollworms and red spider mites, and, in many instances, these pests increased following its use. When 40 percent sulfur was added to the chlordane dust, red spider mite infestations did not develop. Chlordane failed to control heavy aphid populations. However, injurious aphid infestations did not develop following its use, unless it was mixed with DDT.

The toxicity of chlordane to higher animals is greater than that of DDT. Operators should avoid breathing the dust any more than is absolutely necessary. Contamination of food and feed crops around cotton fields should be avoided.

Little is known regarding possible ill effects on plants from accumulations of chlordane in soils.

DDT

DDT will control the bollworm, pink bollworm, tarnished plant bug, rapid plant bug, cotton fleahopper, and thrips. It will not control the boll weevil, cotton leafworm, red spider mites, cotton aphid, and grasshoppers.

In general, DDT is used as a dust for cotton insect control at concentrations of not less than 5 percent or more than 10 percent, either alone or in admixture with other insecticides, and at rates of 10 to 15 pounds per acre. Bollworm and pink bollworm infestations require the higher rates of application, but the lower concentrations and rates are effective for the other insects named. DDT failed to control thrips at temperatures above 90 degrees F. Emulsion sprays containing 2 pounds of DDT applied at the rate of 7½ gallons per acre gave promising control of the bollworm.

DDT often increases aphid populations to a point where severe damage may occur unless some aphidicide is included. Following the use of DDT as a dust or spray, either alone or in combination, boll-

worm infestations sometimes occur after treatments are discontinued.

Either sulfur, pyrophyllite, neutral talcs and clays, or other neutral or slightly acid materials may be used in the formulation of DDT mixtures. Alkaline diluents should not be used. DDT is compatible with all synthetic organic insecticides.

DDT is toxic to certain plants such as cucurbits and, if used in excessive quantities, accumulations in the soil may become toxic to others, especially in light sandy soils lacking humus.

In applying DDT, contamination of adjacent crops from drift should be avoided.

Parasites and predators of insect pests are, in general, susceptible to DDT, and biological control is seriously impaired following its use.

DDT is highly toxic to fish and amphibians, and precautions should be taken to avoid the possibility of stream pollution.

Acute toxicity of DDT to man and animals is rather low as compared with the inorganic insecticides now in use on cotton. However, when DDT is repeatedly ingested or brought into contact with the skin it is absorbed and may be stored in the fatty tissues. Injury to liver may also result. Unnecessary exposure of operators should therefore be guarded against.

Dieldrin ("Compound 497")

Dieldrin, the product known as "Julius Hyman compound 497," was tested against cotton insects in laboratory and extensive field experiments during the 1949 season only. It was highly effective against the boll weevil in either dust or spray formulations at the rate of 0.25 pound per acre. At this dosage it also controlled the cotton fleahopper, tarnished plant bug, rapid plant bug, fall armyworm, variegated cutworm, and thrips.

Somewhat higher dosages appear to be required for some other cotton insects. Laboratory tests with third-instar bollworm larvae indicate that 0.5 pound of the technical material per acre may be required for satisfactory control. In field experiments against light to medium bollworm infestations, 0.4 to 0.5 pound per acre appeared to be satisfactory.

In laboratory tests, 0.5 pound of dieldrin per acre gave satisfactory control of the cotton leafworm, tobacco budworm, and salt-marsh caterpillar.

Dieldrin is not effective against the garden webworm, cotton aphid, and a red spider mite, *Septanychus* sp. Increased infestations of aphids and red spiders have followed its use in field applications.

On the basis of a single year's results, dieldrin is a very promising organic insecticide for boll weevil control. It was found to kill a larger proportion of the weevils developing in squares than any of the other insecticides tested to date. It should be extensively tested by Federal and State agencies under experimental field conditions in 1950.

Dieldrin is highly toxic to mammals. It is readily absorbed through the skin. Skin toxicity is comparable to that of parathion and, since toxic effects may be delayed for several days, extreme precautions should be exercised when handling or applying dieldrin.

Ditolyl Trichloroethane

In laboratory tests, ditolyl trichloroethane was less effective than DDT against the cotton fleahopper, and less effective than toxaphene against the cotton leafworm. Dust concentrations of 5 to 20 percent were ineffective against the boll weevil, bollworm, cotton aphid, garden webworm, salt-marsh caterpillar, and variegated cutworm.

Heptachlor

Laboratory and field tests with heptachlor indicate that it has possibilities in cotton insect control and deserves further field evaluation. Under laboratory conditions a dust containing 2.5 percent of heptachlor compared favorably with a dust containing 20 percent of toxaphene against adult boll weevils, and in addition killed 100 percent of the weevils developing inside punctured squares.

In similar tests, heptachlor was effective against the variegated cutworm and the salt-marsh caterpillar at concentrations of between 2.5 and 5 percent in dust mixtures. It is not outstandingly effective against the bollworm, cotton leafworm, garden webworm, cotton aphid or red spider mites.

Lindane

Lindane has been selected as the common name for the essentially pure gamma isomer of benzene hexachloride. A spray containing 0.3 lb. of lindane with 1.5 lbs. of DDT applied at weekly intervals gave good pink bollworm control and promising results against the boll weevil.

Methoxychlor

Dusts containing 10 percent of methoxychlor controlled the cotton leafworm, but lower concentrations gave poor control. Methoxychlor gave slightly better pink bollworm control than DDT, but a heavy build-up of aphids usually followed its use and it failed to control bollworms. For these reasons it is not being generally used for pink bollworm control.

Methoxychlor is less effective than the insecticides now recommended for the control of the boll weevil, bollworm, cotton aphid, garden webworm, red spider mites and stink bugs. Toxicological studies indicate that methoxychlor is less toxic than DDT to warm-blooded animals.

Nicotine

Two percent nicotine in alternate applications of calcium arsenate (the period between nicotine applications not to exceed 8 to 10 days) if properly applied will usually prevent a cotton aphid build-up. Either two or three percent nicotine in a suitable carrier can be used to "knock out" heavy aphid infestations. At least 0.2 of a pound per acre of free nicotine equivalent should be applied. The source may be either nicotine sulfate or a fixed nicotine in dust form. Applications of nicotine dust to "knock out" heavy aphid infestations should be applied when the air is calm and preferably when there is no dew on the plants. Complete coverage is essential. Nicotine is highly toxic to man and animals and should be used with proper precautions.

Parathion

Parathion will control the cotton aphid, red spider mites, garden webworm, and some species of thrips. It gives very little control of the boll weevil, bollworm, and pink bollworm.

Parathion is an extremely dangerous poison and is not recommended for use on cotton in 1950 except where trained personnel or other individuals are in position to assume full responsibility and to enforce proper precautions as prescribed by the manufacturers.

Sabadilla

Sabadilla dust at 10 percent strength has been found to be effective against the leaf-footed plant bugs. However, it has little residual action and is disagreeable to use. Since there are other more effective materials the use of sabadilla as a cotton insecticide is very limited.

Sulfur

Sulfur has been widely used on cotton for control of red spider mites and the cotton fleahopper. When used in dust mixtures it sometimes has a repressive effect upon aphid populations in some areas. Where red spider mites are likely to be a serious problem, 40 percent or more of sulfur should be included in organic insecticide dusts used on cotton to prevent the development of damaging mite infestations. Properly conditioned dusting sulfur may be used as a diluent for other insecticides when a non-alkaline or an acid carrier is desirable.

Tetraethyl Pyrophosphate

Tetraethyl pyrophosphate, commonly referred to as "TEPP," is highly effective as a spray against the cotton aphid. Experiments indicate that applications containing one-half pint of 40 percent tetraethyl pyrophosphate, or its equivalent, per acre effectively control heavy aphid populations. Sprays containing tetraethyl pyrophosphate are known to be effective against the cotton

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New Selective and Systemic Insecticide

by

Dr. W. E. Ripper

Pest Control, Ltd.,
Cambridge, England

DESPITE the great wealth of knowledge possessed by entomologists on parasites and predators of insect pests, this means of control has been used but little in recent years while the synthetic insecticides have had their heyday. The startling rapidity with which pest populations build up again after a high mortality has been achieved by spraying with kill-all insecticides has demonstrated an application of Volterra's law of the disturbances of averages which postulates that "if an attempt is made to destroy the individuals of two species uniformly and in proportion to their numbers, the average number of individuals of the species that is eaten increases and that of the individual feeding upon the other diminishes."

In addition, H. S. Smith (1941) called attention to the possibility of the artificial segregation of resistant strains of pests by cultural practices such as spraying operations. He referred to this phenomenon as a challenge to the entomologist.

With such a background, it occurred to researchers at Pest Control, Ltd., that both of these undesirable phenomena could be prevented by the use of *selective* insecticides, that is, chemical compounds which kill the pests but do not harm their natural enemies. It would thus allow the latter to control the pests even after the insecticide had spent its action. The few surviving insects are killed by their natural enemies irrespective of whether or not they are resistant genetic variants, and therefore no selection of resistant strains takes place.

This contention was tested in 1944 on *Brevicoryne brassicae*, and found to be incorrect when nicotine gas was used as a selective insecticide. More recently we have found that certain systemic insecticides are selective when used against aphids and Red spider mites.

Systemic insecticides are defined as insecticides translocated in the plant, and effective at some distance from the site of the lodgement of the insecticide. The first ones to be investigated were selenium salts. Hoskins (W.M.) Boyce (A.M.) Lamiman, (J. F.) and Neivswander and Morris showed that this insecticide is translocated and renders the plant toxic to pests for a considerable period of time, but the toxicity hazards to persons handling this chemical have caused its use to be abandoned.

Schrader, who has given entomology so many new insecticides, first synthesized octa methyl pyro phosphoramide, and his entomological colleague Kukenthal discovered its systemic effect. In repeating Kukenthal's experiments it was found that the insecticide was not only systemic but also selective. A fairly big team at the Pest Control Research Station at Cambridge, led by Dr. R. M. Greenslade on the entomological side, and Dr. G. S. Hartley on the chemical side, has investigated the insecticidal action of this compound, studied its effect on plants and mammals and found new and more practical methods of its synthesis.

The phenomenon of translocation is now well established by the work of Kukenthal, Bennett, Davis and Kirby, Floyd Smith, Blauvelt and Pest Control, Ltd. There is a good deal of evidence of translocation upwards after spraying, including the remarkable effect of rendering leaves toxic against aphis which were not present at the time of spraying, but there is, as yet, little published information on translocation *downwards*.

Regarding the insecticidal effect, a good control of fourteen aphis and two Red spiders in England and Africa has been achieved. The compound was used commercially in England last year for the control of Hop aphis *Phorodon pruni*, Red spider *Tetraychus telarius*, Strawberry aphis *Pentatrichopous fragariae*, Cabbage aphis *Brevicoryne brassica*, Rose aphis *Macrisiphum rosae* on roses and *Myzus persicae* on tobacco. In all these cases, prolonged toxicity of from 2 to 5 weeks after spraying has been recorded. Full and low volume spraying was compared and in the case of Myzus on beet, the same quantity of octa methyl pyro phosphoramide in 4 gallons and 100 gallons per acre gave the same results.

Promising results were also obtained in the prevention of aphis-transmitted virus diseases in the case of beet yellow virus which is transmitted by *Myzus persicae* and *Aphis fabae*, and in the case of Strawberry virus transmitted by *Pentatrichopous fragariae*.

Because of the absence of contact insecticidal effect, neither predators such as *Coccinellid* and the larvae of *Syrphidae* nor parasites are killed. Neither are they harmed by feeding on aphids which have died from the poison. It is therefore, not surprising that in field experiments in which octa methyl pyro phosphoramide was compared with parathion and paraoxon, the octa methyl pyro phosphoramide-sprayed fields showed prolonged control after one spray application.

On parathion and paraoxon sprayed plots, however, the infestation re-occurred quickly, and furthermore, in ten to fourteen days, a higher population density than before treatment, was noted.

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Phytopaths Elect Tucker; Discuss Toxicity, Introduce

New Fungicides

C. M. TUCKER, Columbia, Missouri, was elected president of the American Phytopathological Society at the group's 41st annual meeting at Hotels Martinique, and McAlpin, New York, December 28-30. Dr. Tucker succeeds Dr. W. D. Valleau, Lexington, Ky. Other officers named at the three-day meeting were Dr. James G. Horsfall, director of the Connecticut Agricultural Experiment Station, New Haven, vice-president. Dr. Horsfal succeeds Dr. Tucker who became president. Curtis May, U. S. Department of Agriculture, Beltsville, Md., remains secretary of the Society. Dr. A. E. Dimond, New Haven, Conn., was made business manager and treasurer, and Dr. George L. McNew, director of The Boyce Thompson Institute, Yonkers, N. Y., was named a councillor.

New fungicidal materials were introduced to the group at the Fungicide Colloquium Wednesday evening in a session which included a discussion on the Food and Drug Administration hearings, and on registration of fungicidal materials under the Federal Insecticide, Fungicide and Rodenticide Act of 1947. Dr. Frank L. Howard, Kingston, Rhode Island, was chairman of the colloquium.

Tennessee Corporation, Atlanta, Ga., introduced "Tennessee Cop-O-Zink," containing 42 percent copper and 11 percent zinc, and a second product, "Tennessee NU-Z," containing 55 percent metallic zinc. The first compound combines copper and zinc in a neutral compound, chemically stable, and suited for direct treatment of plants in either spray or dust form. It is compatible with essentially all organic insecticides and with cryolite and fluorine compounds, arsenicals and sulfur, according to the makers. Good results have been obtained after using the material on potatoes and tomatoes, it was reported.

The "NU-Z" product is a fixed or insoluble zinc compound which requires no additional lime. It has three uses, according to the manufacturers: 1. for control of bacterial leaf spot of peach; 2. For correction of zinc deficiency diseases; and 3. as a "safener" for arsenicals. Without the addition of lime, it acts as a buffer against the release of water-soluble arsenic.

Socony-Vacuum Oil Co. New York, introduced an experimental horticultural base oil designated as "XT 942-B," prepared as a carrier for oil soluble fungicides and insecticides. The manufacturers state that it is an isoparaffinic fraction nearly devoid of the phytotoxic effects characterizing other conventional highly refined petroleum oils. In experiments on foliage of a variety of plants, the product has shown but little phytotoxic properties as compared to kerosene, aromatic solvents and highly refined paraffinic oil on beans, potatoes and tomatoes.

Mallinckrodt Chemical Works, New York, described its product "Cadminate" for use in turf disease

Phytopaths at New York meeting: (L to R) Dr. Curtis May, U. S. Dept of Agriculture, who remains as secretary of the A.P.S.; Dr. Helen Hart, University of Minnesota, St. Paul, editor-in-chief of "Phytopathology"; Dr. C. M. Tucker, Columbia, Missouri, newly-elected president of A.P.S.; Dr. M. C. Richards, treasurer; and Dr. W. D. Valleau, Lexington, Ky., out-going president of the Society.

control on golf greens, lawns and fine turfs in general. The compound is described as a readily wettable and dispersible cadmium salt of an organic acid, with 60 percent active ingredient. The content of cadmium is 29 percent.

Shell Chemical Corporation, New York, told about its product "OS840," technical chlorobromopropene, samples of which will be made available in the spring for laboratory and limited field testing. The material contains 35.5 percent chlorine and 34.5 percent bromine. Tests thus far indicate that it may be valuable in control of soil fungi. Further tests are under way at the company's agricultural laboratory at Modesto, Calif.

Panogen Company, New York, introduced to the group a new liquid seed disinfectant, "Panogen," which was indicated to be available in experimental quantities from the makers. Specific details of the product were lacking in the oral report.

Carbide & Carbon Chemicals Corp., New York, presented further data on the company's line of "Crag" fruit fungicides, formerly known as "341B" and "341C." Data was also presented on "Crag Potato Fungicide 658"; and a group of experimental fungicides presently known only by their laboratory numbers: "224"; "640"; "5379"; "341SC"; and "5400."

Appearing on the colloquium program were Lea S. Hitchner, executive Secretary, National Agricultural Chemicals Association, Washington, D. C.; Dr. James G. Horsfall, New Haven, Conn.; Ernest A. Walker, U. S. Dept. of Agriculture, Washington, D. C.; T. B. Bellis, U. S. Food and Drug Adminsistration, Washington; and Dr. Howard, chairman. Robert A. Kehoe, Kettering Laboratories, Cincinnati, scheduled to appear on the program, was unable to be present.

Dr. Horsfall reported on the Second International Institute of Crop Protection which he attended in England during the summer, describing in particular, emergent European fungicides. He said that although there were 18 papers on fungicides at the conference, no new ones were discussed. Although many of the newer insecticides came from Europe originally, such as DDT, BHC and parathion, most of the fungicides originate in the U. S., he pointed out. He urged that U. S. workers should form liasion with European scientists to study all compounds which are biologically active on higher plants.

Dr. Walker, in discussing registration in connection with the Insecticide, Fungicide and Rodenticide Act of 1947, said that all fungicides should have been registered with the U.S.D.A. in June, 1948, but not all are registered even yet. He emphasized that *all* economic poisons must be registered, and warned that manufacturers who have neglected doing this would be wise to register immediately.

He described the difference between labels and labeling, stating that the former is the sticker on the outside of the container, while "labeling" includes separate printed matter which accompanies the package. He raised the question about when a coined name becomes a common name, and stated that this must be decided by the states. At present, newly-coined common names like "zineb" must be followed by the chemical name for explanation. Certain types of fraudulent labeling can bring criminal action by the Federal Government, he reminded.

Dr. Bellis reviewed the procedure to be followed in the F.D.A. tolerance hearings. The rules to be adopted, he reminded, are to serve the function that traffic rules do in public travel. The objective is not to forbid use, but rather to permit the fullest safe use of economic poisons to protect the public. Mr. Bellis presented a rough "time table" for the hearings, pointing out that the evidence will be heard in five parts. First, he said, will be evidence concerning fruits and vegetables . . . the quantity of insecticides and fungicides necessary for their protection; how the residue may be removed, etc. This procedure may take up half of the hearings, since there are so many combinations of plants and insecticides and fungicides involved, he said. The other four parts of the hearing will discuss which substances are poisonous or deleterious; the quantity which consumers may get from all sources; the degree of toxicity involved; and finally, a miscellaneous schedule to pick up loose ends, as Mr. Bellis put it.

In the first section, Federal Agencies will be heard first, then State agencies, then witnesses from associations, growers, manufacturers, etc. How long this portion of the hearings will run is difficult to guess, he said, but the testimony of federal and state agencies is expected to require perhaps five weeks.

Mr. Hitchner emphasized the importance of presenting evidence to substantiate the "necessity for use" of disease control materials, including data to show which chemicals are essential in the production of food crops and on which fruits and vegetables tolerances should be established. "Unless substantial evidence on these points is presented, the case for disease control materials could go by default and growers might well be denied the use of materials upon which they are dependent to produce . . . fruits and vegetables," he declared. Although it is taken for granted that disease control materials are essential in food production, nevertheless, this point must be proved at the hearings so that the Administrator may have a basis on which to determine final tolerances acceptable in the interests of both growers and consumers, he stated.

Dr. Howard, in reviewing plant and animal toxicity of fungicides in use during the past year, presented new terms to describe the action of different materials. He used the word "Toxicodynamics" to describe the reactions between toxic substances and living structures; and reported studies on the "biotoxicity" of various chemical compounds. Reports from several states indicated a few unfavorable reactions to various fungicides during 1949. These included:

Sulfur. "Burn on peaches noticeable following spells of extreme heat in Ontario. "Burn on apples from sulfur-"Ferbam" combination during hot weather in Vermont. The magnitude of the injury seemed dependent upon these factors: the amount and distribution of the mild sulfur deposit, regardless of kind (paste, wet

dust or dry wettable) which was on the fruit; low soil moisture conditions; exposure of trees in the orchard; and method of spray application (percent sulfur content and "thickness" of deposit.)

"Phygon." Trace metal impurities are presumed to increase injury from the product. Russet of Delicious apples was reported from Massachusetts, and injury to plants low in sugars was reported from Rhode Island.

Copper. Organic Salts. Defloration and russetting of apples was reported from Rhode Island.

Phenyl mercury salts ("Puratized," "Tag 331," "PMAS") Inconsistent injury was caused to apple foliage in several states. Phytotoxicity was apparently correlated with clorophyll content of leaves; that is, the more clorophyll, the less injury. The presence of polymercurials in the product has been offered as an explanation for the greater toxicity, Dr. Howard reported.

In the case of toxicity to animals, it was reported that some materials which are considered to be non-toxic, had caused irritation to individuals in scattered locations, although other factors entered into the cases. One instance concerned "Phygon" in which operators complained of severe burning sensations upon exposure to spray. This was later associated with the anemic condition of the two men thus affected, Dr. Howard said.

He concluded that one should not generalize on the animal toxicity of fungicides, since the same specificity of action which obtains for fungi also occurs against man, presenting a multiplicity of factors in each case.

Forcasting Symposium

THE Plant Disease Forecasting Symposium included papers on recent research in forecasting together with discussion of aids now employed in developing accurate forecasts. Russell B. Stevens reviewed the history of forecasting, stating that the first formal forecast was made in 1923.

Dr. K. Starr Chester, Battelle Memorial Institute, Columbus, Ohio, told the group that nine years of forecasting wheat leaf rust in Oklahoma have been successful. Predictions made on April 1 of each year were "amply justified" by harvest time, not only for Oklahoma (where the predictions were made) but usually for much of the wheat belt to the north. He pointed out that the predictions of plant disease outbreaks and losses are not guesswork.

The symposium, under the chairmanship of Dr. Paul R. Miller, head of the plant disease survey, B.P.I., U.S.D.A., included a paper by Dr. Jack R. Wallin, Ames, Iowa. He reported on the influence of climate on the development and spread of *Phytophthora infestans* in artificially inoculated potato plots, stating that temperature and humidity data from a plot inoculated with the disease, will permit prediction of the rate of spread of the blight fungus.

The symposium chairman, Dr. Miller, concluded the session with a brief report on some recent advances in long-range weather forecasting. It was pointed out that since all of the diseases included under the forecasting project are greatly influenced by weather, this information in the hands of plant pathologists will probably enhance the forecasting of plant diseases.

1949 Fungicide Tests

A SYMPOSIUM covering the performance of fungicidal sprays and dusts during the past season, was under the chairmanship of Dr. J. D. Wilson, Wooster, Ohio. Dr. J. M. Hamilton, Geneva, N. Y., noted in his paper that the compatibility of fungicides with insecticides must receive more study, since organic fungicides work best when used in the most pertinate sprays or mixed with other organics or sulfur. "The season of 1949 was such that wettable sulfurs . . . gave adequate commercial scab control" on apples, he said.

Dr. Wm. M. Epps, Charleston, S. C., reported on tests of fungicides on cucurbits. He stated that none of the nine materials tested was effective in the control of scab on cucumbers, but that some had been effective on anthracnose.

A paper prepared by Dr. M. B. Linn, Urbana, Ill., told of fungicide tests on tomatoes in 15 states. "In general," he summarized, "ziram (zinc dimethyl dithiocarbamate) was perhaps slightly more effective against anthracnose than zineb." (zinc ethylene bisdithiocarbamate) However, on the whole, no really significant differences exist among any of the dithiocarbamates, he said.

A similar report on potatoes was presented by Dr. W. F. Buchholtz, Iowa State College. He stated that potato spray fungicides prevented defoliation and increased yields in 1949. Specifically, the zinc organics; "Dithane" and "Parzate" outranked other materials. Tribasic copper sulfate plus zinc was next, he said.

Other reports heard on the symposium included trials on carrots and celery, A. G. Newhall, Cornell Univ.; snapdragon, Dr. A. W. Dimock, Cornell; gladiolus, Dr. A. A. Foster, Farmingdale, L. I., for J. L. Fosberg, Urbana, Ill.; and turfs, by Dr. Howard, Kingston, R. I.

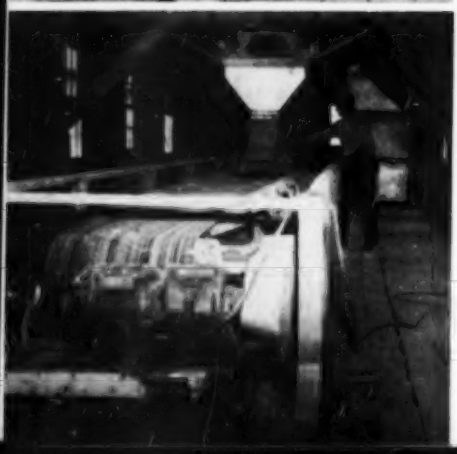
A paper by M. T. Hilborn and F. H. Lathrop, Agricultural Experiment Station, Orono, Maine, reported on the organic fungicides in the control of Apple Scab and European Red Mite.

"Chemicals for Dutch Elm Disease Therapy" was the title of a paper presented by Drs. A. W. Feldman and F. L. Howard, Rhode Island, and N. E. Caroselli, Bartlett Tree Research Laboratory, Stamford, Conn. They reported that hydraulic soil impregnation with lime suppressed wilt symptoms for at least one month when soil pH was maintained at 7.0 or slightly above. Low magnesium lime gave better disease control than high magnesium lime, and hydraulic soil impregnation with urea salicylate, and azo dye, alone or combined, did not suppress symptoms effectively. These chemicals, combined with low magnesium lime, gave approximately 70 and 50 percent control, respectively. Equal control was obtained when this combination was applied in the fall, spring or summer.

The annual Phytopath banquet was held on Thursday evening with an attendance of nearly 300. The local committee chairman for the convention was Dr. E. G. Rex of Trenton, N. J. Members of his committee were O. N. Liming, U. S. Department of Agriculture; P. P. Pirone, New York Botanic Gardens and L. M. Black Brooklyn Botanic Gardens.

A Visit to the Southern Cotton Oil Co's Newly Modernized Florence, S. Carolina

FERTILIZER PLANT



THE feat of more than doubling fertilizer production while reducing the manpower to less than half the number required under the former system, has been accomplished at The Southern Cotton Oil Company's plant at Florence, South Carolina. The newly-rebuilt plant now processes some 45 tons of mixed fertilizer per hour with from ten to a dozen men, whereas before the modern material handling equipment was installed, the production was around 10 tons per hour with sometimes as many as 40 men on the job.

How this was done is related with justifiable pride by the plant's manager, Claude V. Brown. A representative from *Agricultural Chemicals*, visiting the plant a short time after its opening, was shown through the entire operation from the storage bins where the basic materials for mixed fertilizer are stored, to the loading platform at the far end of the 500 foot building where the bagged products are loaded onto trucks or into freight cars.

The most obvious departure from the commonplace in fertilizer mixing plants is a "traffic light" system to inform the operators of four Hough Payloaders what material is needed at any given time. This system, devised by W. B. Nickles, assistant to A. D. Kincaid, district fertilizer manager at the company's office at Columbia, S.C., by-passes the need for experienced workers who know the names of various raw materials which go into the company's mixed products.

Storage bins are numbered from one to fourteen, to correspond with numbers on a board operated by the man "upstairs" who sees to it that the correct materials are supplied for the mixture being compounded at a given time. If he needs muriate of potash, out of bin five, for instance, he merely moves his board so that a big "5" shows on the lower level where the dump-car operator sees it and begins to haul that material to the elevator which takes it up to the mixer hoppers. A white light beside the board tells the supplier to keep delivering the same material continuously. But when the upstairs man flashes a red light, that means to stop bringing the present material, and to look at the board for a new number which will tell the operator from which storage bin to start operating anew. The process continues then until the red light flashes again to warn of a new assignment. According to manager Brown, the system is practically fool-proof. Operators require a minimum of instructions, they don't have to read the names of the material, nor indeed do they have to know what the particular stuff is that is in bin No. 2 or 6 or 4. Their knowledge may be limited to simply that of distinguishing a red light from a white one, and knowing the numbers from 1 to 14.

In the Photos

Cleaning up after conveyor belt has finished filling hopper on third floor of fertilizer plant.

(Middle photo) "Shuttle belt" extended to full length to fill hopper at remote end of building. Note flanged wheels and track to facilitate moving belt to fill different hoppers.

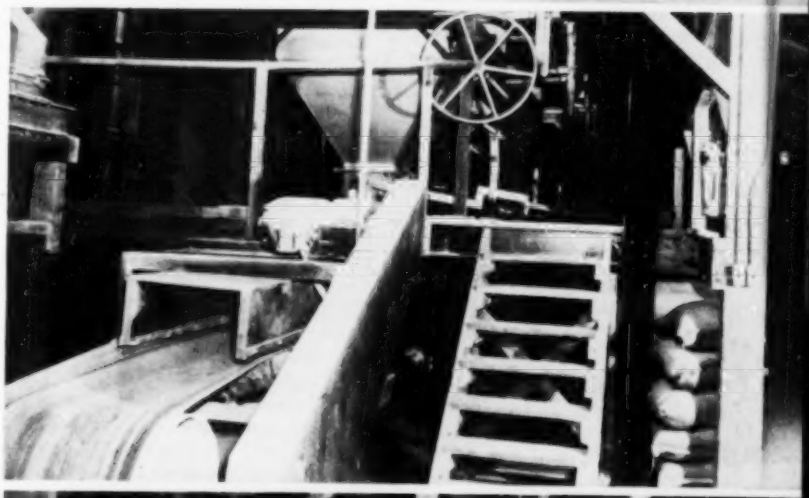
(Lower) End of shuttle belt showing how it receives material from upper belt in constant location, and directs material to correct hopper.

The average time for making the run between bin and hopper is about 45 seconds, according to the manager who has kept close tab on such things. The little trucks shuttle back and forth on a concrete runway with very little lost motion, he observes. None of the fertilizer materials are transported by hand. A complete system of overhead carrier belts conveys the raw materials to the proper bins. The installation, put in by the Atlanta Utility Works, Atlanta, Ga., has been called "one of the most up-to-date fertilizer plants in the world" by observers.

Aside from its mechanical excellence, the Florence plant carries on astute business practices to move the goods it produces. In the first place, the plant operates the year around, even though the manufacture of fertilizer is mostly a seasonal procedure. From about September to the following November, the fertilizer crew is used in the ginning of cotton in an adjoining building, so that the employees have year-round work and the firm is able to keep its experienced help from season to season.

The company is not adverse to in-

(*Turn to Page* 88)



In the Photos

(Above) Exterior of The Southern Cotton Oil Co. Fertilizer Plant at Florence, South Carolina.

(Second from top) Number board which tells dump truck operator from what bin to get fertilizer material. On post in center are "traffic lights," red & white. Loads are dumped in hole at lower right of photo.

(Next to bottom) Conveyor belt removing accurately weighed fertilizer materials to mixer on floor below.

(Lower) Mixed fertilizer stored in bins for proper conditioning. Note adjustable "slat" partitions.

Tampa Meeting of AAEE Presents Data on toxicity, application, and

NEW INSECTICIDES

NEW developments in agricultural insecticides were prominent on the program of the American Association of Economic Entomologists, held at Tampa, Fla., December 13-16. The A.A.E.E. met jointly with the Entomological Society of America, and during the four day session other groups also met including the Cotton States Branch of the A.A.E.E., the Florida Entomological Society and the Florida Pest Control Association, making Tampa the entomological center of the country at least for that week. Among the new materials which attracted particular attention were the new synthetic allyl analog of Cinerin I, on which new test results were announced, a new translocated insecticide, octa methyl pyro phosphoramide, previously used commercially in Great Britain and now being made in the United States, and a number of new developments in the field of miticides.

Also prominent on the program were a series of papers and floor discussions on the development of insecticide resistance in various insects. This is currently the number 1 problem which entomologists face and the resources of the entire industry are being pooled to find the answer.

C. P. Clausen, vice-president of A.A.E.E. during 1949, was elected president for the coming year, succeeding A.M. Boyce of University of California, Riverside. Dr. Clausen is the leader, Division of Control Investigations and Foreign Parasite Introduction, U.S.D.A., Washington. He is succeeded as vice-president for the coming year by Roy E. Campbell, head of the Station on Vegetable Insects, Alhambra, Calif. E. N. Cory, University of Maryland, continues as secretary-treasurer.

The Entomological Society of America elected Dr. William P. Hayes, University of Illinois, as president; Dr. Joseph Bequaert, Harvard University, 1st vice-president; Dr. S. E. Flanders, Riverside, Calif., 2nd vice-president; and Dr. Herbert Ross, Urbana, Ill., secretary-treasurer.

It was announced that the 1950 meeting would be held in Denver, Colo.

Merger Is Proposed

A PROPOSAL to merge the American Association of Economic Entomologists and the Entomological Society of America, which has been under consideration by the governing boards of the two organizations, was discussed further, and a progress report was issued by the committee which has had the matter in charge. Members of the committee include: for the A.A.E.E., B. A. Porter, chairman, H. M. Harris and J. L. Horsfall; for the E.S.A., C. F. W. Muesebeck, chairman, E. G. Linsley and C. E. Mickel.

Tentative plans for consolidation of the two organizations have been submitted to the respective executive committees. These plans are reported in agreement in many respects, with both groups feeling that consolidation is desirable. The merged group would take the name of the Entomological Society of America. A substantial increase in dues is anticipated, one of the purposes being to provide for the services of a full-time paid executive officer to have charge of the organization's business affairs. The two committees will continue their consideration of the subject as a joint committee. It is anticipated that the eventual proposal for merger, as approved by the executive committees of both organizations, will be presented to the entire membership of each organization for study and decision. Further discussion is anticipated at next year's meeting.

President's Address

A. M. BOYCE, A.A.E.E. President, addressed the opening session, December 13th, commenting particularly upon the challenge which entomologists face in the apparent tendency for insects to develop resistance to various insecticides used to control them. He characterized this as the greatest problem the economic entomologist has ever had to face, but predicted that, in the final analysis, it will prove a great boon to the industry by making necessary the initiation of fundamental studies in physiology and toxicology, which will inevitably produce the information needed to solve the problem.

Dr. Boyce reviewed the contributions of citrus entomology toward the development of fundamental principles and practices of entomology. Insect attacks on the country's valuable citrus crops have been responsible, over a long period of years, for, first, the inception of quarantine activity, later, the development of biological control and more recently, for a long series of developments in chemical control. Kerosene emulsions were first developed, he reminded, to control citrus insects. Much of the work in the development of emulsifiers was stimulated by this need. Some of the first of the synthetic insecticides were also developed for use by the citrus industry, the dinitro cyclo hexyl phenols, for instance, developed for the control of mites on

A.A.E.E. OFFICERS AND DIRECTORS

Above (L to R) LeRoy Childs, entomologist, Hood River, Oregon; S. A. Rohwer, U.S.D.A., Washington, D. C.; A. M. Boyce, Riverside, California, retiring A.A.E.E. president; Charles E. Palm, Cornell University, Ithaca, New York; C. P. Clausen, U.S.D.A., Washington, D. C., newly-elected A.A.E.E. president; Roy E. Campbell, new A.A.E.E. vice-president; and E. N. Cory, College Park, Md., A.A.E.E. secretary-treasurer.

citrus trees in foliage. Citrus entomologists, he added, have also been responsible for much work in studying susceptibility variations and also for studies of the mode of action of insecticides,—thereby benefiting the rest of the industry tremendously.

Cotton Insects

PAPERS on insects affecting cotton were grouped in a special session the afternoon of December 13, presided over by E. W. Dunnam, B.E.P.Q., Leland, Miss., and K. P. Ewing, B.E.P.Q., Waco, Texas. The results of the past year's work seem to indicate a continuing trend toward successful use of sprays, and early season applications of toxicants. In a paper on sprays vs. dusts for boll weevil control, for example, L. C. Fife, R. L. Walker and F. F. Bondy of the B.E.P.Q., Florence, S. Car., reported that while both sprays and dusts of toxaphene, toxaphene-DDT, Chlordane-DDT, BHC-DDT and compound 497 gave about equal control, with the exception of the BHC-DDT formulations, the average yield in the sprayed plots ranged from 65 to 287 pounds of seed cotton per acre more than in the dusted plots.

K. P. Ewing and C. P. Parencia, Jr., B.E.P.Q., Waco, reported that early season treatment hastened fruiting and advanced maturity of cotton two to three weeks. In many fields no late-season treatment was needed.

Results of comparative toxicity tests with a number of newer insecticides against various cotton pests were reported by C. F. Rainwater, E. E. Ivy, A. L. Scales and Wm. Iglinsky, Jr., B.E.P.Q., College Station, Texas, in their paper. Tests were conducted at College Station, during 1949 with compounds 118, 497, CS-645A, CS-674A, chlordane, heptachlor, toxaphene, benzene hexachloride, regular calcium arsenate, and special calcium arsenate against the boll weevil, boll worm, cotton leaf-worm, cotton aphid, and red spider mite. Compounds 497, 118, toxaphene, and special calcium arsenate were outstandingly effective against the boll weevil; compound 497, toxaphene, and special calcium arsenate were outstandingly effective against the bollworm; toxaphene, benzene hexachloride, and calcium arsenate were outstandingly effective against the leafworm. None of these compounds showed a high degree of specificity against the red spider mite, and only benzene hexachloride was outstandingly effective against the cotton aphid.

M. T. Young and R. C. Gaines, B.E.P.Q., Tallulah, La., reported in their paper that calcium arsenate plus 2 percent of nicotine, 15 percent chlordane, 3-5-40, 20 percent toxaphene, a special calcium arsenate containing 1 percent parathion, various appliations of 3-5-40 and calcium arsenate, 2 percent of 118, and 1½ percent of 497 give satisfactory control of both boll weevil, and cotton aphids. Mixtures of organics containing 40 percent of sulfur gave adequate control of two-spotted spider mites.

New Products for 1950

OF particular interest to commercial entomologists was the session the afternoon of December 14 at which new commercial materials and formulations were discussed. Dr. W. E. Ripper of Pest Control, Ltd., Cambridge, England, discussed octa methyl pyro phosphoramide, marketed commercially in England as "Pestox 3." (See page 29 for full text of this report.)

A new du Pont insecticide, ethyl p-nitrophenyl thionobenzene-

phosphonate (EPN) was described by a representative of that company. It shows promising acaricidal and insecticidal properties, he indicated, sharing the high toxicity toward mites demonstrated by several of the organo-phosphorous compounds, while at the same time being one of the safest to use among the effective compounds reported to date. Promising results were obtained on apples, pears, peaches, cherries, onions, corn and other crops. In field tests "EPN" has been used to control the following mites: red spider, European red, citrus red, Pacific, Bryobia (brown or clover) and Willamette. It has also shown promise for use against the following insects: plum curculio, onion thrips, olive scale, Oriental fruit fly, codling moth and European corn borer. The product will be available for use by commercial growers during the 1950 season. It will be formulated as a 30% wettable powder.

A representative of U. S. Rubber Co., Bethany, Conn., described "Aramite" (88R) containing as the active ingredient beta-chloroethylbeta-(p. tertiary butyl phenoxy)-alpha-methyl ethyl sulfite. Offered as a 15% wettable powder, it is used as a miticide on trees, shrubs, fruits, vegetables, ornamentals and cotton. Test data indicate it to be effective against a large number of mites, with prolonged residual control in many cases. It will be available for field experiments and limited commercial use in 1950.

"Merthon," a poly ethyl mercury phosphate for the control of aphis, mites and scab, is another new product, manufactured by Eastern Chemical Corp., Crozet, Va., and distributed by Central Chemical Corp. of Virginia, Harrisonburg, Va. A combination insecticide-fungicide, the product is intended as a supplement to a wettable sulfur and iron carbamate spray program. It will be available in limited commercial quantities this season.

A representative of Geary Chemical Corp., New York, which has recently entered into a contract with Farbfabriken Bayer, Leverkusen, Germany, to manufacture and sell their developments in the field of agricultural chemicals in the United States, described the first of these products which will be offered for sale under the name, "Gearphos." The active phosphate ingredient is said to be a mixture of the dimethyl analog of parathion and parathion to the extent of 33⅓%. The balance is an inhibitor of mammalian toxicity, compound #8139, a poly ethylene glycol ether. It is claimed to be superior to wettable parathion powder for control of aphids and most lepidoptera, and some adult beetles,

(Top Photo) (front row, L. to R.): H. F. Dietz, chairman of the Resolutions Committee, A.A.E.E.; E. W. Dunnam, chairman of the Cotton States Branch, A.A.E.E. (standing) H. H. Ross, secretary-treasurer, E.S.A.; and K. P. Ewing, secretary-treasurer of Cotton States Branch, A.A.E.E.

(Middle Picture) Joseph B. Skaptason, Pittsburgh Agricultural Chemicals Co., New York; L. Holland, Sherwin-Williams Co., Cleveland, Ohio; and Paul Mayfield, Hercules Powder Co., Wilmington, Del.

(At Bottom) University of Minnesota Entomologists' Alumni breakfast at the Tampa Terrace.

equal on mites, and lower on the larvae of some beetles, like Mexican bean. It is said to be significantly less toxic than parathion. The formulation is now approved for sale for experimental use only. Other Geary products which will be available in 1950 for research purposes, only, include a new German thiophosphate, #838, and one or two phosphates for systemic or inner plant therapy,

How Insecticides Kill

AN explanation of the manner in which some of the new insecticides kill was presented by Dr. R. L. Metcalf, University of California, in his paper, "Insect Toxicological Studies with New Compounds." The organic phosphate insecticides such as parathion, tetraethyl pyrophosphate and their derivatives, he pointed out, are extremely effective inhibitors of the enzyme, cholinesterase, and this inhibition accounts for their toxic action in insects and mammals.

Toxic Residues

THE entire subject of toxic residues on plant and animal products, following insecticide use, was discussed at the morning session, December 15. In a paper by D. E. Howell and F. A. Fenton of Oklahoma A. & M. College, Stillwater, reports were submitted on analyses of milk and tissues from animals sprayed with DDT, chlordane, BHC, methoxy DDT and toxaphene. Unless cattle were sprayed much more frequently than was necessary for external parasite control, these investigators reported, the total organic chlorides present in the milk were not greater than 2 ppm regardless of the insecticide used. Less than 10 ppm were stored in the tissues.

In a paper reporting on experimental work on the same subject at the Kerrville, Texas laboratory, three years' studies on the effects of use of sprays and dips of DDT, TDE, methoxychlor, chlordane, toxaphene, lindane and mixed isomers of BHC were reviewed. All of these insecticides when applied as sprays or dips, were absorbed and stored in the fat, it was reported. Spraying dairy barns with DDT or TDE for fly control resulted in milk contamination unless special precautions were taken.

Contamination of milk by feeding of alfalfa sprayed with DDT, toxaphene or chlordane, was discussed in a paper by L. A. Moore and R. E. Ely of the Bureau of Dairy Industry, and R. H. Carter and F.

(*Turn to Page 75*)

(Top Photo) Drs. H. L. Haller, F. C. Bishopp and E. W. Knipling, all of Bureau of Entomology & Plant Quarantine, U.S.D.A. Second photo, L to R: Rerbert Spencer, Entomologist in charge, Citrus Insect Laboratories, Bureau of Entomology and Plant Quarantine, U.S.D.A., Gainesville, Fla.; W. Mercer Rowe, Flag Sulphur & Chemical Co., Tampa; Chm., Special Committee of Fla. Research Institute; and Dr. & Mrs. John T. Creighton, University of Florida, Gainesville. Dr. Creighton was chairman of Local Arrangements, and Mrs. Creighton headed Ladies Entertainment Committee.

Third picture: The 1948 officers of the E.S.A. (photo was taken before new officers were named). Back row: (L to R) Z. P. Metcalf, N. Carolina State College, Executive committee; O. E. Tauber, Iowa State College, executive committee; C. E. Michel, University of Minnesota, executive committe; and M. T. James, State College of Washington, Editor of Annals. Front row: H. H. Ross, Illinois Natural History Survey, Secretary-treasurer; Alvah Peterson, Ohio State University, president; A. G. Richards, University of Minnesota, first vice-president; and P. O. Ritcher, N. Carolina State College, 2nd vice-president. At bottom, L to R: Richard Yates, Hercules Powder Co., Wilmington, Del.; Jack Brunton, Kolker Chemical Co., Newark, N. J.; Frank Maughan, Rohm & Haas Co., Philadelphia; L. J. Padret, B.E.P.Q., Gulfport, Miss. and W. R. E. Andrews, Philadelphia.

N. Central Weed Conference Meets at Sioux Falls-Presents

Policy Committee's Report

RECOMMENDATIONS for use of chemicals for control of various weeds were presented by the research committee of the North Central Weed Control Conference at the 6th annual meeting of the group at Sioux Falls, S. D., December 6-8. Dr. W. W. Worzella, head of the Department of Agronomy, South Dakota State College, Brookings, was elected president of the Conference to succeed Dr R. S. Dunham, University of Minnesota. The new vice-president is H. E. Wood, Commissioner of Weeds, Manitoba Dept. of Agriculture, Winnipeg, Canada. He succeeds Dr. Glen Viehmeyer, University of Nebraska Experiment Station, North Platte, Nebr. Secretary-treasurer for 1950 is Dr. Oliver Lee, Extension Botanist, Purdue University, Lafayette, Indiana, succeeding Dr. E. A. Helgeson, North Dakota State College, Fargo.

The meeting, with headquarters at the Cataract Hotel, featured speakers from many sections of the U. S. In addition to the appearance of the Conference officers on the program, speakers included A. S. Crafts, University of California, Davis; K. P. Bucholtz, Univ. of Wisconsin; R. P. Sylwester, Iowa State College; F. M. Dosch, S. D. State college; W. A. Harvey, Monsanto Chemical Co., St. Louis; L. W. Melander, U.S.D.A., Minneapolis,; T. F. Yost, Dept. of Agriculture, Topeka, Kansas; W. P. MacDonald, F. H. Peavy & Co., Minneapolis; U. J. Norgaard, S. Dakota State College; Clyde Spray, Dept. of Agriculture, Des Moines; F. J. Greaney, Line Elevators Farm Service, Winnipeg, Canada; E. K. Alban, Ohio State University; L. M. Stahler, S. Dakota State College; W. G. Loomis, Iowa State College; C. J. Willard, Ohio State University; R. H. Beatty, American Chemical Paint Co., Ambler, Pa.; and B. H. Grisby, Michigan State College, E. Lansing, Mich.

Milwaukee, Wisconsin was named as the convention city for the 1950 meeting, December 12, 13 and 14. Program chairmen will be H. E. Wood and Dr. Frank J. Greaney, Winnipeg, Canada. Chairman for the 1950 meeting arrangements is George Briggs, Extension Agronomist, University of Wisconsin, Madison.

The following is taken from the Policy Committee's report on general weed control recommendations for 1950. The recommendations cover control of perennial weeds, annual weeds, use of herbicides in growing crops, and on woody plants. They also comment on new herbicides mentioned in last year's research report, stating that a number of these have been under experimentation, but none have reached the point where they can be recommended for general use.

Control of Perennials

ALTHOUGH difficult to control with 2,4-D, best results come from treating perennial weeds during the growing stage—generally near the bud stage. Repeat treatments are necessary. Where long-time control under cropping conditions is the objective, the rate of application should be governed by the maximum amount that crop will tolerate.

The research committee recognizes the value of chlorates, borates and similar chemicals for the control of perennial weeds, especially for obtaining quick eradication of small patches of weeds. Rates of application in the range of from 3 to 6 pounds per square rod for chlorates and 15 to 30 lbs. per sq. rd. for borates are usually required. These materials will sterilize the soil for a year or more.

Canada thistle. Repeated applications of 2,4-D for several years are usually necessary. First application at the bud stage, and retreatments when the re-sprouting thistle plants are in the rosette stage. From ½ to 2 lbs. 2,4-D per acre is suggested.

Perennial Sowthistle. Effective control by 2,4-D is obtained in cereal crops when applied at about ½ lb. per acre. Three-quarters to 1½ lbs. applied at the bud-flower stage has achieved nearly complete eradication. Repeated treatments usually necessary to eliminate surviving plants.

White Top or Hoary Cress. May be controlled by 2,4-D esters, since species is moderately tolerant to the herbicide. Seed production is prevented, top growth stopped and the stand reduced by one application at the bud to early bloom stage. Repeated treatments for 3 or 4 years have eliminated weeds in grass sod and on cultivated land in connection with cultivation and growth of crops. Treatments at rates of 1½ to 2½ pounds per acre in early bloom and/or fall rosette stages are recommended. These rates will injure most crops. Plants that emerge within 3 or 4 weeks after treatment should be spot treated.

Field Bindweed. Most susceptible to 2,4-D when just starting to bloom, but may be controlled at other stages if growing vigorously. One-half to one pound per acre is required.

Leafy Spurge and Russian Knapweed. 2,4-D is useful for control on growing crops when applied at approximately

Worzella Named NCWCC President for 1950. Select Milwaukee, Wis. for next meeting.

½ pound per acre. On non-cropped land, particularly where spurge is in competition with agressive grass, some control may be obtained through an application of one pound 2,4-D per acre. Best at bud and bloom stages. Repeated applications are necessary. (Chlorate and borax compounds may be used on small patches of these weeds.)

Horse Nettle. From 1½ to 2 pounds 2,4-D per acre, applied as wetting spray, reduces stands of weed. Best results from spraying at the full bloom stage. Timing is important here.

Perennial Weedy Grasses. TCA is effective for control of established stands of quack, Bermuda, Kentucky blue, *Muhlenbergia spp.*, and brome grasses when applied at the rate of 80 to 100 lbs. per acre. Promising control of Johnson grass is seen at 100 lbs. per acre. Best results on Johnson grass when spray is applied to the tops of growing plants, when optimum moisture conditions for plant growth prevail.

Smaller amounts of TCA gave excellent results on quack grass when used in conjunction with plowing or disking of soil. One may plow land 2 to 4 weeks before applying TCA, or may spray immediately after shallow plowing. For this use, 40 to 50 lbs. per acre are recommended. Extensive further studies are needed. Crop susceptibility varies greatly.

Control of Annual Weeds

MANY annual weeds are controlled by 2,4-D, but some are resistant. They are more susceptible in the seedling and early stages of development, and when conditions are such as to promote vigorous growth. Some weeds, resistant at later stages of growth, are readily killed when young. Dosages as low as ⅛ lb. will control some annuals, but local authorities should be consulted for specific instruction.

Practically all of the annual broad leaved and grass weeds can be controlled in the seedling stage by physical means and by contact or residual herbicides. Dinitrophenols, pentachlorophenols, pentachlorophenates, aromatic oils, salt, chlorates and borates may be used. Varying periods of soil sterilization may follow application of most of these chemicals, and state recommendations for use of these should be followed.

In Growing Crops

LEGUME Seedings in Grain. The use of dinitro sprays is recommended for control of broad leaved weeds in grain when legume seedings must be maintained. Use of from 6 to 8 pints of products with a 13 percent active ingredient content, in 60 to 80 gallons of water is suggested. Maintenance of legume seedings in grain following treatment with 2,4-D is hazardous, markedly influenced by local conditions, and will usually result in some reduction in legume stand. The following factors are known to favor maintenance of legume stand:

1. Application of not more than ¼ lb. 2,4-D per acre.
2. Use of sodum and amine salts of 2,4-D.
3. Application of sprays when wheat is 8 to 10 inches high, measured to tip of extended leaves.
4. Use on ladino, alsike, medium red and mammoth clovers. Alfalfa and sweet clover are less tolerant to 2,4-D than the other legumes listed.

Flax. Should be sprayed with 2,4-D as soon as there is enough emergence of susceptible species of weeds to make spraying practical. Flax may be badly injured if sprayed in bud or bloom stages. Amine salts, sodium salts and esters of 2,4-D may be used, but smaller dosages of esters than of salts are recommended. Dinitros may be used to control wild mustard, stinkweed and other broad leaved annuals, but local conditions must be considered.

Spring planted wheat, oats and barley. Don't apply 2,4-D to these crops before they have grown to 4 to 6 inches. A maximum of ¼ to ½ lb. 2,4-D per acre may be applied before the fully tillered stage and a maximum of ½ to ¾ pound per acre after the fully tillered stage—except from the boot to dough stage—without much damage to grain. The lower suggested rates should be maximum when esters are used.

Fall-planted wheat, oats and barley. At its most resistant stages, winter wheat will tolerate dosages large enough to control most annual weeds without serious injury to the crop. Most 2,4-D damage occurs during boot and heading stages; therefore, spring applications should be made after the crop is fully tillered and before it reaches the boot stage, or be delayed until after the kernels are in the dough. (Fall applications not recommended). Rates of ¼ to ½ lb. 2,4-D as an ester or ½ to ¾ lbs. as an amine or sodium salt will usually be sufficient for annual weed control if applied before the boot stage. Large weeds sprayed later in the season require more 2,4-D and control is often not satisfactory. Where heavy applications are necessary to control perennial weeds, some damage to the crop may occur. Limited information is available on barley and oats, but these crops seem to be similar in their reactions to wheat.

Corn. (Post-emergence) Some injury to corn should be expected. Lodging, brittleness, curvature of stalks and malformation of brace roots are the symptoms. Such symptoms of injury may or may not affect yields. Reductions in yield are often caused by reduced stands due to breakage of stalks during the period of brittleness following spraying. The degree of injury is increased as dosage is increased. One-half pound of 2,4-D acid per acre is maximum dosage. Sodium and amine salts usually cause less injury to corn than esters when applied at equal rates.

Differences in tolerance of strains and varieties of corn to 2,4-D should be recognized. Use minimum 2,4-D dosages when tolerance of corn is unknown. Timing is important for control of weeds in corn. When large corn is sprayed, the use of nozzle extensions will reduce danger of injury. Small corn appears to be more tolerant of 2,4-D than corn 20 to 36 inches high, or at least less subject to breakage of stalks following spraying. Good growing conditions for corn are conducive to injury. (Use of 2,4-D for controlling weeds in corn is recommended in fields where weeds cannot be controlled by ordinary cultivation. It should not be relied upon to replace cultivation, but rather to be used in conjunction.)

For effective *pre-emergence* treatment of corn with herbicides, a number of factors are involved . . . particularly moisture and the time of germination of weed seeds. Pre-emergence treatments of corn with 2,4-D are not recommended on sandy soils, acid soils or soils of low fertility. Such treatments are recommended where weed control problems cannot be solved by other means. Pre-emergence treatments should usually be applied 5 to 7 days after planting. One and one-half to two lbs. 2,4-D per acre will give good weed control with minimum corn yield reduction.

Sorghums. These may be seriously injured by 2,4-D, so should be sprayed only when weeds may be controlled in no other way. Minimum dosage of ¼ to ½ lb. per acre should be used, although some varieties may tolerate heavier dosages. (others are injured by very light applications.)

Sugar beets and soy beans. No chemical treatment for weeds in these crops has given results to warrant recommendations for 1950.

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Horticultural Crops

CHEMICAL weed control with horticultural crops should be regarded as only an aid to cultivation and not as a substitute for it. Excepting carrots and corn, much more research is required before general suggestions for herbicide use may be made. In carrots, light oils with an aromatic content of approximately 10 to 16 percent are suitable for control of annual weeds and grasses. 2,4-D may be used in sweet corn but definite varietal differences in the tolerance to 2,4-D exist. State recommendations should be followed. For post-emergence use, the maximum safe dosage is ¼ lb. ester and ½ lb. salts. The results now available do not warrant general recommendations for use of pre-emergence treatments with 2,4-D in sweet corn. No pre-emergence recommendations made for asparagus, beans, beets, onions, spinach and melon crops. Pentachlorophenols, dinitrophenols, 2,4-D and aromatic oils offer promise, but rates and timing have not been established.

Post-emergence usage of herbicides can be made in asparagus, onions, potatoes and beets, but the results are dependent on a number of factors. State recommendations should be followed. In asparagus, cyanamid is safe for the control of young annual weeds. The use of 2,4-D in asparagus is a questionable procedure. 2,4-D and dinitrophenols are not safe for use in beets. TCA should not be used in horticultural crops, in small fruits nor under fruit trees.

Use of 2,4-D is suggested for control of weeds in first-year strawberry beds and in non-fruiting older plantings, but 2,4-D should not be used on flowering or fruiting strawberries. Newly-set strawberry plants should not be sprayed until such plants are well established in the soil. Weeds in raspberries can be controlled with 2,4-D provided that direct application of the spray to growing tips is avoided. Use of 2,4-D in or near vineyards at any season is hazardous and not recommended.

Although the use of 2,4-D and 2,4,5-T in orchards has shown promise, the long-time effects on fruit trees have not been determined, and these chemicals are not recommended in orchard use. Ammonium sulfamate at ¾ lb. per gallon of water is suggested for control of poison ivy in orchards. Annual weeds may be controlled by the use of various contact herbicides. Avoid allowing direct contact of spray with trees.

Woody Plants

BECAUSE 2,4,5-T will kill some woody plants not killed by 2,4-D, the former appears to have a place in the woody plant program. For killing woody plants sensitive to foliage sprays of 2,4-D or 2,4,5-T, concentrations of .2 percent of the esters are recommended. (where drift and volatility are not problems).

Only during the month of May can 2,4-D give satisfactory kill of sand sage. The esters of 2,4-D should be applied at the rate of ¾ lb. per acre. The amine and sodium salts should be used at 1 lb. Both of these rates should be increased by ¼ lb. during dry seasons. The esters of 2,4-D should be applied in 3 gallons of oil or 1 gallon of oil plus 4 gallons of water per acre. The latter mixture is suggested for use in applying amine or sodium salts.

For general foliage spraying of mixed brush populations, mixtures of 2,4-D and 2,4,5-T apear to be satisfactory. The latter has given best results on brambles and several hardwood species. Application of dry ammonium sulfamate to the cut surfaces of stumps is recommended to prevent sprouting.

Ammonium sulfamate and sodium chlorate are recommended for control of woody plants in situations where 2,4-D and 2,4,5-T cannot be used. Dormant applications of at least 1 percent 2,4-D or 2,4,5-T in oil have given promising results and should be given more extensive field trials.

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Livestock Pest Control

Toxaphene and lindane were recommended on December 19 by entomologists of the U. S. Department of Agriculture for the control of several of the most serious insect parasites of livestock.

Toxaphene is recommended for the control of ticks, lice, hornflies, and sheep ticks on all livestock except dairy cows. For controlling ticks and lice on cattle and swine, sprays containing .5 percent toxaphene should be used. Lice on sheep and goats and the sheep tick can be controlled with dips containing as little as 0.1 percent toxaphene.

Hornflies are controlled nearly as well with sprays containing toxaphene as those containing DDT. When used as a 0.5 percent spray at the rate of about 2 quarts per mature cow, the period of protection afforded by toxaphene is about three weeks. Ticks of nearly all important species can be controlled with toxaphene sprays. Toxaphene will protect animals from reinfestation by ticks for two to three weeks or longer.

Lindane is recommended also as a spray for the control of lice on dairy cows, and for the control of lice and ticks on other cattle. For louse control a concentration of 0.03 percent is recommended. Used alone, lindane will not prevent reinfestations by certain species of ticks for periods longer than a week to ten days. When used at a concentration of 0.025 percent lindane in combination with 0.5 percent DDT, however, its period of protection can be lengthened to two or more weeks. Lindane as a dip containing 0.02 percent of the chemical will also control lice and sheep ticks on goats and sheep. The entomologists caution livestock men that concentrations recommended for insect control on livestock should not be exceeded.

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To Form New Firm

The Geary Chemical Corp. New York and Pittsburg Coke and Chemical Company have announced that they will form a jointly owned subsidiary company to produce and market certain new insecticides developed by the German chemical company Farbenfabriken Bayer.

These insecticides are to be made available for manufacture and distribution in the United States under terms of a contract between Bayer and the Geary Chemical Corp. and approved both by the American and British occupation authorities in Western Germany.

Extension of Geary Chemical Corporation's agreement with Bayer to cover other agricultural products such as fungicides, rodenticides and plant hormones, as well as insecticides, is provided for, as is the exchange of related technical and scientific information.

Products licensed to the new joint subsidiary of Pittsburgh Coke and Chemical Company and Geary Chemical Corp. under the terms of the agreement between these two corporations will be marketed, initially at least, both by the Pittsburgh Agricultural Chemical Company and the Geary Chemical Corp. itself.

William J. Haude and Robert J. Geary, both of whom are well known in the insecticide trade, are presidents, respectively, of the Pittsburgh Agricultural Chemical Company and the Geary Chemical Corporation.

The Listening Post

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Dr. Haeussler is in charge of Insect Pest Survey and Information, Agric. Research Adm., B. E. & P. Q., U.S.D.A. His observations are based on latest reports from collaborators in the department's country-wide pest surveys.

By G. J. Haeussler

A CONFERENCE of Federal and State workers concerned with cotton insect research and control was held at Jackson, Mississippi, November 28-30, 1949. Research and extension entomologists, and associated technical workers interested in cotton insects, from 11 cotton-growing States, the U. S. Dept. of Agriculture, and the National Cotton Council of America reviewed and summarized their experiments.*

While the discussions centered largely around the various insecticides that were tested or used during the year for the control of cotton insects, considerable emphasis was also placed on the use of cultural control methods. It was pointed out that the control of cotton insects by the use of insecticides should be considered as supplemental to the adoption of good farming practices which include early fall clean-up, use of proper cotton varieties, seed treatment, early planting, fertilization, proper land use, and cultivation. The value of destroying or killing the cotton plants by either mechanical or chemical methods, as early as possible before the first killing frost, as a means of controlling the pink bollworm and the boll weevil in some areas, received considerable discussion. It was shown that early stalk destruction, especially over community-or county-wide areas, as practiced in the Lower Rio Grande Valley and other parts of Texas to control the pink bollworm, has greatly reduced the boll weevil problem in such areas.

Cotton insect workers from the several state and federal stations reviewed the results of experiments during the past season with various insecticides and formulations. The materials tested against cotton insects included: aldrin (previously known as Julius Hyman compound 118), benzene hexachloride, calcium arsenate, chlordane, DDT, dieldrin (previously known as Julius Hyman compound 497), ditolyl trichloroethane, heptachlor, lindane, methoxychlor, nicotine, parathion, sabadilla, sulfur, tetraethyl pyrophosphate, and toxaphene.

The conferees devoted considerable attention to a discussion of the hazards involved in the use of the newer synthetic organic insecticides, with reference to their effect on the user, on soils and crops, on fish, and on beneficial insects including parasites, predators, and honeybees. Precautions with regard to use of the phosphorus compounds, such as parathion and tetraethyl pyrophosphate, were particularly emphasized. A number of suggestions were made to aid in holding bee losses to a minimum when insecticides are applied to cotton.

The subject of early-season application of insecticides for the control of cotton insects received considerable discussion, but the conferees did not appear to be generally in agreement as to the value of this practice. A processed publication, E-792, entitled, "Early-Season Application of Insecticides for Cotton Insect Control," by K. P. Ewing and C. R. Parencia, Jr., issued in December 1949 by the Bureau of Entomology and Plant Quarantine, presents the results of community-wide tests conducted near Waco Texas in 1949 with two early-season applications of dusts or sprays containing one of the new all-purpose insecticides for the control of cotton insects.

A report on the cotton insect research and control conference that was held at Jackson, Mississippi was issued under date of December 16, 1949 by the Bureau of Entomology and Plant Quarantine in cooperation with 11 cotton-growing States. Copies of this report are being distributed to entomologists, research and extension workers, the insecticide industry, and others interested in cotton production. The results summarized in this report will aid in the preparation of recommendations that may be issued by State agencies and the U. S. Department of Agriculture on the control of cotton insects for 1950.

Corn Borer Discussed

STATE and Federal entomologists of the Eastern States most immediately concerned with the problem of controlling the European corn borer through the use of insecticides, met at Baltimore, Maryland, on November 21, 1949 in connection with the Eastern States Branch, AAEE. Those in attendance included representatives from Canada, Connecticut, Delaware, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Virginia, the Bureau of Entomology and Plant Quarantine, and the Bureau of Plant Industry, Soils, and Agricultural Engineering of the U. S. Department of Agriculture. The purpose of the meeting was to develop recommendations for the use of insecticides for European corn borer control, based on the results of research conducted by all the agencies concerned.

Growers who have experienced losses from this insect are urged to plan control measures in advance of the season. The European corn borer has been satisfactorily controlled through the use of insecticides applied as suspensions in dilute water sprays and in dust form.

*Insecticide recommendations for 1950 appear on page 25, this issue.

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DDT is generally recommended, except under certain soil conditions, particularly in New Jersey where injury has resulted from its use. The conferees agreed that the use of aircraft is not yet generally recommended for applying insecticides for corn borer control.

Vegetable Pests in Nov.

MEXICAN bean beetle populations decreased rapidly in southern areas during the early part of November due to seasonal conditions. They had reached a low ebb in all areas by the middle of the month, although adults were still reported occurring on remnants of beans in parts of Virginia.

The bean leaf roller was very abundant in Florida toward the middle of November and unusually heavy populations persisted toward the end of the month on beans which escaped damage from a period of freezing weather.

Cabbage caterpillar infestations remained moderate to heavy throughout most of the month on crucifers in commercial plantings or home gardens in most southern states from which reports were received. They appeared to be declining in Virginia and Louisiana toward the end of the month. These insects were numerous on crucifers in southern Texas and in California during the last half of November.

The vegetable weevil was damaging turnips and other cruciferous crops in South Carolina and Georgia throughout most of the month. Toward the end of the month it was also reported damaging mustard and turnips in Louisiana.

The southern green stink bug was reported during the month infesting crucifers in Florida, Alabama, Louisiana, South Carolina, and Georgia. It was also numerous on okra and other crops in Louisiana and Florida, and early in November was damaging potatoes and in some instances field peas in Georgia, Florida, Alabama, and Louisiana.

A root aphid was seriously infesting various cole crops in Louisiana during the last half of November, and flea beetles were injuring young turnips in Texas. Moderate infestations of the Hawaiian beet webworm and the green peach aphid occurred on spinach in Virginia throughout the month.

Spider mites were causing serious losses to strawberries in North Carolina early in November and were infesting celery in California. Lygus bugs were injuring lettuce and carrots in South Carolina most of the month, and mole crickets were damaging young onions in that state and various vegetables in Mississippi.

The serpentine leaf miner was increasing on late tomatoes in California during the first half of November, and the tomato fruitworm was causing serious losses to the fruits of tomato in some fields that did not receive adequate applications.

Pecan Scab Spray Experiments in S. Carolina

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

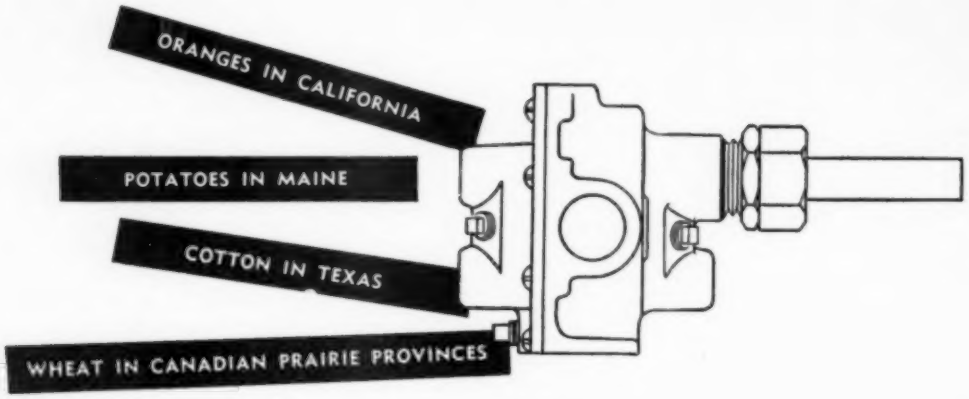
PECAN scab, caused by the fungus *Cladosporium effusum*, is one of the limiting factors in profitable commercial production of scab-susceptible varieties of pecan in South Carolina. In recent years sales from pecans grown in this State have approached $1,000,000. For several years South Carolina has rated sixth place, among southern States, in the production of nuts of improved pecan varieties.

These statements are according to H. H. Foster and other workers at the South Carolina Agricultural Experiment Station, who summarize results of 1948 spray experiments with the susceptible variety, Schley. Spray plots were set up in two counties, near Orangeburg in Orangeburg County, and at the Edisto Experiment Station in Barnwell County. In the Orangeburg plots the grower's power spray equipment was used, while at the Edisto Station a man experienced in custom spraying was engaged to do the job.

On the Orangeburg plots the following fungicides were used: Bordeaux mixture applied as a 4-1-100 formulation for the first spray and 6-2-100 in the later spray; "Copper-A" 3-100; "Zerlate" (zinc dimethyl dithiocarbamate or ziram according to the newly accepted list of common names for fungicidal chemicals) 2-100; "Parzate" (zinc ethylene bisdithiocarbamate or zineb) 2-100; and Cu-Zn compound, mixed for pecan spraying 5-100. At the Edisto Station three materials were used: Bordeaux mixture; "Zerlate"; and "Karbam White" (ziram) 2-100. Unsprayed (control) trees were included at both locations. Sprays were applied four times during the season. The first application was made between April 16 and May 1, and preceded pollination. The other three were made at successive intervals of approximately 30 days. In addition, DDT (2 pounds of a 50% dust) was added to the last spray application at Orangeburg. At the Edisto Station two similar applications of DDT were made, the first with the final fungicide spray, and the second a few weeks later during August.

Unhulled nuts were examined for scab infection during the first week of September. Nuts were grouped in 5 classes according to amount of scab infection, as follows:

1—no infection on shuck (free from scab)
2—1 to 3 initial infections on shuck
3—4 or more initial infections on shuck
4—few secondary infections on shuck



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OBERDORFER BRONZE PUMPS

Table 1.
Results of 1949 spray experiments for control of pecan scab on Schley pecans in South Carolina.

Treatment	Percent scab infection per class					Average No. of nuts per pound
	1	2	3	4	5	
ORANGEBURG						
None	0	1.1	0.7	20.9	77.1	127.3
Bordeaux Mixture	56.2	42.0	0.8	0.8	0.1	122.8
"Copper-A"	60.2	36.7	1.4	1.1	0.3	115.1
"Zerlate"	69.0	30.2	0.3	0.4	0.0	105.4
"Parzate"	56.6	25.3	2.7	12.4	2.8	112.0
Bordeaux 1st and 4th spray. Tenn. Cu-Zn compound 2nd and 3rd spray	5.2	42.1	31.4	19.5	1.5	128.8
1st spray omitted. Tenn. Cu-Zn compound 2nd and 3rd spray Bordeaux 4th spray	1.5	21.4	51.0	22.9	3.0	129.3
EDISTO STATION						
None	0	0	0	0.4	99.5	86.0
Bordeaux Mixture	15.3	29.9	25.0	25.9	3.6	69.5
"Zerlate"	0	0	0	3.9	96.0	83.9
1st spray omitted 3 following sprays with "Karbam White"	0.3	6.7	19.0	43.6	30.1	72.0

5—numerous secondary infections on shuck (severely scabbed)

In addition, the effect of each treatment on the number of nuts per pound was ascertained from random samples collected from representative trees. Table 1 summarizes the results obtained, in amount of scab infection and effect on size of nuts.

At Orangeburg none of the sprayed trees produced more than 3 percent severely scabbed (class 5) nuts, whereas 77 percent of the nuts from unsprayed trees fell in class 5; also, the unsprayed trees failed to produce any nuts free from scab (class 1). At Orangeburg, "Zerlate" was the best treatment, with 69 percent of the nuts in class 1, followed by "Copper-A," "Parzate," and Bordeaux mixture. The Cu-Zn compound appeared to be the least effective of the fungicides tested: under this treatment a high percentage of the nuts were in classes 2 and 3. All nuts were of small size at the Orangeburg plots, at least partly because of the limited rainfall during the summer months at this location. The total rainfall, from April 1 to August 31, at the Edisto Station was 28.3 inches; at the Orangeburg plots it was only 17.19 inches. The monthly average rainfall for the five months at the Edisto and Orangeburg plots was 5.66" and 3.43" respectively.

Scab was more severe at the Edisto Station than at Orangeburg. Of the nuts from unsprayed trees, 99.5 percent were in class 5. "Zerlate" failed to control scab at this Station, since 96 percent of the nuts under this treatment were in class 5. The only effective treatment was Bordeaux mixture, with 3.6 percent of the nuts in class 5. Although only 15.3 percent of the Bordeaux-sprayed

(*Turn to Page 70*)

TABLE 2 — Effectiveness of different spray treatments on the control of brown rot of peaches in transit and storage. South Carolina experiments, 1948[a]

Plot number	Spray treatments: Blossom sprays First	Second	Third	Petal fall	Calyx	First cover	Second cover	Third cover	Fourth cover	Fifth cover	Percent brown rot in storage: Chicago[b] Top layer	Bottom layer	Clemson "Cold storage	"Room storage
1	Lime sulfur	—	—	Wettable sulfur + ZnLime	Wettable sulfur + ZnLime	Wettable sulfur + ZnLime	Wettable sulfur	Wettable sulfur	Wettable sulfur	Wettable sulfur + ZnLime	2.7	1.5	0.5	1.0
2	Lime sulfur	Lime sulfur	Lime sulfur	"	"	"	"	"	"	Lime only	11.9	16.9	4.1	7.7
3	"	"	"	"	"	"	"	"	"	Wettable sulfur + Lime	2.7	0.5	1.7	0.5
4	Phygon	Phygon	Phygon	"	"	"	"	"	"	"	1.4	2.1	0.0	1.6
5	—	—	—	"	"	Phygon + Lime	Phygon	Phygon ½ strength	Phygon ½ strength	"	4.5	3.3	0.0	1.1
6	—	—	—	"	"	Zerlate + Lime	Zerlate	Zerlate	Zerlate	Zerlate + Lime	1.4	2.5	0.0	2.1
7	—	—	—	"	"	Parzate + Lime	Parzate	Parzate	Parzate	Parzate + Lime	4.5	9.1	0.0	6.3
8	—	—	—	"	"	Parzate Zerlate Lime	Parzate Zerlate	Parzate Zerlate	Parzate Zerlate	Parzate Zerlate Lime	21.5	15.4	2.7	13.1
9	Commercial Sprayed—6 or 7 applications wettable sulfur (Speed-sprayer)										—	—	11.0	19.2

[a] Insecticides were added to all treatments as follows: lead arsenate (acid) 2 lbs. to 100 gals., in petal-fall, Calyx drop, first cover, fifth cover, DDT, 2 lbs. of a 50% concentration to 100 gals., in third and fourth cover.

[b] 4 days in transit and 4 days at room temperature (75-85°F.).

[c] 6 days at 36-45°F. 3 days at 75-85°F.

[d] 4 days at 75-85°F.

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Determination of DDT in Milk Produced in Barns Sprayed With

DDT INSECTICIDES*

By

H. J. Harris[1], E. J. Hansens[2] and C. C. Alexander[3]

TWO important announcements had a profound effect upon the insecticide trade during the past year. One was the report by Laake (1), that DDT could be found in milk as a result of the application of DDT insecticides to dairy barns. The other was a recommendation by the U. S. Department of Agriculture, issued about the same time, that the use of DDT sprays for controlling insects in dairy barns should be discontinued.

The desire for additional information on the subject prompted the launching of a cooperative barn-spraying project which was conducted by the Entomology Department of the New Jersey Agricultural Experiment Station, Rutgers University, and the Geigy Company, Inc. (Since the purpose of this paper is to present only the results of a chemical study of milk obtained from cows housed in barns sprayed with DDT insecticides, the data on fly control will be discussed in a subsequent paper.) Analyses of the milk samples were made in the Bayonne, N. J., laboratory of the Geigy Company, Inc.

Description of Barns

THE four dairy barns sprayed in these experiments were located in central New Jersey. Sanitation conditions were very good in all barns except No. 4, which was below average. Milk from the latter barn was sold in bulk, while milk from the other barns was bottled on the premises. All of the barns had concrete floors and rough surfaced walls and ceilings, except one wing of barn No. 3, which had painted plywood walls and ceiling. Barn No. 1 was sprayed with methoxychlor during the summer of 1948, while the others were treated with DDT insecticides.

Spray Applications

SPRAYS in these experiments were applied on May 11 and 12, 1949, with a power sprayer at a pressure of 200 pounds per square inch. The walls and ceilings of the barns were thoroughly covered with spray. Feed troughs and drinking fountains were covered by tarpaulins during the spraying. Feed and salt blocks were either covered or removed. The stanchions were not intentionally sprayed; neither were they protected from accidental application. All of the cows were out of the barns during the actual spraying and were kept on pasture for the duration of the sampling period, except for milking. A summary of the spray applied to each barn is shown in Table 1.

Sampling Methods

TWO quarts of commercially bottled milk were selected from all barns, except No. 4, at each sampling. The sample for analysis was taken from a mixture of these two quarts. At barn No. 4, samples were hand-milked composites taken from about 10 cows. Approximately one quart of milk was taken at each sampling. Samples were treated with formalin at rate of one ml. per quart milk and stored at 35°F. until the analytical procedure was begun. As indicated in Table 2, two samples were taken from each barn before the spray application, one on the day of application (evening milking), and samples 1, 3, 7 and 14 days after the spray.

TABLE 1

Spray Applications, May 11 and 12, 1949.

Barn No.	Spray Materials Amount/100 gals. of spray	Gallons of Spray Applied
1	180 lbs., 5% DDT in clay base	50
2	120 lbs., 5% DDT in clay base plus 10 lbs., 50% DDT wettable powder	25
3	20 lbs., 50% DDT wettable powder	35
4	20 lbs., 50% DDT wettable powder	25

TABLE 2

Results of Analyses of Milk from Barns Sprayed with DDT Insecticides. Figures Indicate ppm of DDT.

Date of Sampling	Barn No. 1	2	3	4
4/27 before spray	0	.05	0	0
5/9 before spray	0	0	0	0
5/11—5/12 day of spray	0	.03	0	.03
5/12—5/13 one day after	0	0	0	.04
5/14—5/15 three days after	0	0	.03	.03
5/18—5/19 one week after	0	0	0	.05
5/25 two weeks after	0	0	0	0

[1] Chemist, Geigy Company, Inc.
[2] Associate Research Specialist in Entomology, N. J. Agri. Exp. Sta.
[3] Entomologist, Geigy Co., Inc.
[*] Paper of the Journal Series, N. J. Agri. Exp. Station, Rutgers Univ., The State Univ. of N. J., Dept. of Entomology.

Analytical Procedure

THE method of Schechter, et al. (3) was used for the extraction of DDT and fat from the milk and the subsequent separation of the fat from DDT. Instead of the 100 gram sample as called for in the procedure, a 50 gram sample was used in the analysis. The DDT was analyzed colorimetrically by the method of Schechter, et al. (4) with certain modifications as proposed by Clifford (5).

After the removal of the butter fat, the milk residue was nitrated along with 10 mg. of oleic acid. The usual spray residue nitration technique was used, where the mixture is brought slowly from ice-bath temperature to about 85° C., then placed on a steambath for ½ hour.

Ethyl ether was used for the extraction of the diluted nitration mixture. The ether extract was washed with 10 ml. portions of 10% W. V KOH. After the final wash with saturated NaCl solution, the ether extract was filtered through fine glass wool and was evaporated. The flask, in which the ether extract was evaporated, was heated on a steam bath for 1 hour.

The residue was taken up with 5mls. of benzene and the color developed with 10 mls. of sodium methylate. Spectrophotometric measurements were made in a 5 cm. cell at 600 milimicrons using a Beckman quartz Model DU Spectrophotometer.

A standard working curve was set up by adding known amounts of technical DDT to blank milk samples and analyzing them, following the above procedure. A faint blue coloration was produced with as little as 10 micrograms of DDT. This represents a concentration of 0.2 ppm for a 50 gram sample of milk.

Milk samples from the four dairy farms described above were similarly analyzed. The results are tabulated in Table 2. In no case was there a visible blue color which would positively indicate the presence of DDT.

Discussion

RESULTS of these experiments reveal that by following simple precautions it is possible to spray well managed dairy barns without danger of a significant milk contamination. It is doubtful that the indication of minute amounts of DDT in one or two scattered samples, as in barns Nos. 2 and 3, has any significance. However, when four consecutive samples show evidence of containing DDT (barn No. 4), the results probably are significant.

There were no indications of DDT contamination in any of the samples taken from barn No. 1. In barn No. 2, indications of a DDT content were found in the first before-spray sample and the sample taken the day of the spray. The only sample indicating DDT contamination in barn No. 3 was that taken three days after the application. Samples taken from barn No. 4 on the day of spraying as well as samples taken one day, three days, and one week after spraying were found to give indications for minute amounts of DDT. Since this barn had the poorest sanitation, it appears that under these conditions milk contamination is more likely to occur. This was the only barn where samples were hand milked. These data reveal that if milk contamination does occur following barn spraying applications, it probably comes from careless handling of milk rather than from inhalation, contamination of feed, cows licking sprayed surfaces or any of the other ways that have been suggested. The pattern of contamination in barn No. 4 is not similar to that resulting from the feeding of forage crops carrying a DDT residue.

Summary

Four dairy barns in New Jersey were sprayed with DDT insecticides. Feed troughs, and drinking fountains were covered. Feed was either removed or covered and the cows were removed during the spray applications. Milk samples were taken from each barn two times before and five times after the application. Although a visible blue color, which positively indicates the presence of DDT in the analytical method used, was not found in any of the samples, 7 of 28 samples showed spectrophotometric evidence of containing from .03 to .05 ppm of DDT. Four of the seven apparently contaminated samples came from the barn where the least sanitary milk-handling methods were followed. The results indicate that when good dairy practices are followed, barn sprays applied with simple precautions are not likely to result in milk contamination.

Literature Cited

(1) Laake, E. W. Chlorinated hydrocarbons and their toxicity to domestic animals. Paper presented at the North Central States Branch of the American Assoc. Econ. Entomol. Milwaukee, Wisconsin. March 24-25 1949.

(2) U. S. Department of Agriculture. U.S.D.A. entomologists recommend substitute insecticide for DDT to control insects on dairy cattle and in dairy barns. Mimeo. Washington, D. C. March 24, 1949.

(3) Schechter, M. S., M. A. Pogorelskin and H. L. Haller. Colorimetric determination of DDT in milk and fatty materials. Ind. Eng. Chem., Anal. Ed. 19:51. 1949.

(4) Schechter, M. S., S. B. Soloway, R. A. Hayes and H. L. Haller. Colorimetric determination of DDT. Ind. Eng. Chem. Anal. Ed. 17:704. 1945.

(5) Clifford, P. A. Determination of DDT, particularly in milk and fats, by the Schechter procedure. J.A.O.A.C. 30:337. 1947.

Test results indicate that when good dairy practices are followed, barn sprays applied with simple precautions are not likely to cause contamination of milk. Most affected milk came from barns where least sanitary measures were taken to safeguard supply.

Method of Bioassay for Traces of PARATHION In Plant Material

by Kenneth Nolan and Frank Wilcoxon

American Cyanamid Co.
Stamford, Conn.

THE development of parathion (O,O - diethyl,O - p - nitrophenyl thiophosphate) as an insecticide for use on fruit and vegetable crops has involved the determination of this compound in spray residues on a variety of materials. A colorimetric method has been described recently (1) which permits the estimation of as little as 20 micrograms in the final solution. When dealing with plant tissue the method will determine concentrations as small as 0.1 ppm. and estimate lower concentrations based on the weight of the plant material.

Questel and Connin (3) have shown that parathion can be absorbed by the root system of young corn plants from soil receiving high dosages of the chemical and can be translocated rendering the leaves and stalks toxic for a certain period of time to corn borer larvae placed on them. These observations made it desirable to develop a bioassay method capable of detecting and estimating small amounts of parathion in or on plant tissue for correlation with the colorimetric procedure mentioned above.

The extraordinary sensitivity of mosquito larvae to parathion led to the hope that a satisfactory bioassay method might be developed using the larvae as a test insect.

Preliminary work with water suspensions of plant tissue, macerated in a Waring blendor, using larvae of *Aedes aegypti*, indicated that many such extracts were toxic to the larvae, in the absence of parathion. It was found subsequently that benzene extracts of macerated tissue from treated plants contained most of the parathion present originally (80-90%), while such extracts from untreated plants were, for the most part, non-toxic to the larvae.

It was thus possible to develop a satisfactory method based on the comparison of two dose-mortality curves: (a) a curve obtained by diluting a standard solution of parathion containing untreated plant extract; (b) a curve obtained by diluting an extract of treated plant tissue, each cc. of which represented a known amount of plant material. The median lethal dose or LD_{50} of (a) expressed in micrograms of parathion per beaker divided by the LD_{50} of (b) expressed in grams of plant material per beaker gives the content of parathion in the tissue expressed in parts per million. The following procedure was finally adopted.

(1) *Preparation and evaluation of sample.* One hundred to two hundred grams of the plant material is macerated in a Waring blendor with an equal weight of water, and the resulting suspension is extracted with benzene as described in (1) giving a final benzene solution each cc. of which represents approximately 1 gram of sample. Various amounts of this solution are pipetted into 300 cc. beakers and the benzene evaporated with an air jet. The residue is dissolved by adding ½ cc. of acetone to each beaker and then 24.5 cc. of water added. Twenty-five cc. of water containing 10 three-day old larvae of *Aedes aegypti* are then added, and the beakers allowed to stand for 40 hours covered with a watch glass. At the end of this period counts of dead larvae are made, and the results plotted on log probability paper. The criterion of death is taken as the inability of submerged larvae to rise to the surface. At each concentration 3 replicate beakers are used, so that the number of larvae used in establishing the dose-mortality curve is from 90-120 individuals. The LD_{50} value expressed in grams of tissue per beaker may be estimated from the line fitted by eye to the data plotted on log probability paper, or the more elaborate methods of Bliss (2) may be used if desired.

(2) *Preparation of Parathion Standard.* A benzene extract of untreated plant tissue is prepared as previously described for the treated sample to yield a final concentration of 1 gram of untreated plant tissue per cc. of benzene. To 24 cc. of this extract is added 1 cc. of an .00012 5% solution of parathion in benzene to obtain the standard parathion solution containing 0.05 micrograms of parathion per cc. of benzene extract or 0.0521 micrograms of parathion per gram of plant material. Various amounts of the standard solution are pipetted into 300 cc. beakers to give concentrations of parathion ranging from .025 to 0.15 micrograms per beaker. The general procedure out-

(*Turn to Page* 74)

Sample	P.P.M. Parathion by Chemical Analyses	P.P.M. Parathion by Bioassay
Green onion bulbs three months after planting sets in soil containing 100 lbs/acre of Parathion	0.11	0.10
Potato foliage two months after planting in soil containing 100 lbs./acre of parathion	0.30	0.20
Corn foliage one month after planting in soil containing 25 lbs./acre parathion	0.16	0.16
String beans, 2% Dust, 4 X beans developed since dusting 7/9/48, Sampled 7/22/48.	0.01	0.02
String beans dusted 7/2/48 beans formed at time of dusting, picked 7/6/48	0.80	0.83

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Suppliers' Bulletins

IPC Booklet Available

Copies of the booklet "The ABC of IPC," describing uses of the herbicide isopropyl phenyl carbamate, are available from the Jack Wilson Chemical Co., P. O. Box 809, Stockton, California. The pamphlet contains information on the various crops and ornamental plants which have been field treated with the material, and indicates the grasses on which successful control has been effected. Other information includes a discussion of past experience with the material, how to avoid failures, and cautions about its use.

•

Offers Dust Data

Dicalite Division of Great Lakes Carbon Corp., New York, has issued a recent technical bulletin on "Dicalite Diatomaceous Aids to Industry," describing use of the material as carriers for insecticides and conditioning agents for fertilizers. Dicalite is used as a fluffing agent for heavier dusts in insecticides; as a carrier for gaseous and liquid toxicants; and as an absorbent in seed disease control, the makers state. For fertilizers, the material is used as an anti-caking agent. The bulletin is available from the company's offices, Los Angeles, Calif.

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Issue Safety Catalog

Willson Products, Inc., Reading, Pa., has just issued its new safety equipment catalog, covering the company's line of eye and respiratory equipment. Included is a discussion of types of respiratory hazards, and suggestions on what respirators to use for specific hazards, and care and maintenance of respirators.

•

"EPN," New Insecticide

E. I. duPont de Nemours & Co., Inc., Wilmington, Del. has developed a new insecticidal material, "EPN" ethyl p-nitrophenyl thionobenzene phosphate) which has shown promising acaricidal and insecticidal properties. The material has been found to control red spider, European red mite, citrus red mite, Pacific, Bryobia (brown and clover) and Willamette. It has shown promise for control of insects such as plum curculio, onion thrips, olive scale, Oriental fruit fly, Oriental fruit moth, codling month and European corn borer.

EPN will be available for commercial use by growers during the 1950 season, the company states.

•

Weed Recommendations Out

The Great Western Division of Dow Chemical Co. has issued a weed control chart for 1950, giving specific instructions for use of herbicides for control of weeds in grain, pastures, non-crop areas, for woody plants and brush, and other places. The instructions include information on what herbicide is recommended, the amount to use per acre, when to use it, and other information under the head of "remarks." Copies are available from the Dow San Francisco office, 310 Sansome St.

Monsanto "Penta" Booklet

An illustrated 25-page booklet on the use of pentachlorophenol as a wood preservative has been announced by Monsanto Chemical Company, St. Louis, Mo.

The booklet presents examples of the advantage of treating wood with pentachlorophenol solutions, showing how properly used solutions of the chemical, commonly known as "penta," are said to protect wood from attack by decay and wood-eating insects. Copies are available from the company.

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Herbicide Bibliography

"Bibliographical Report on Herbicides" is the name of a recently-published work by R. R. Heal and D. G. Thompson, graduate students at the University of Minnesota, under the direction of Dr. R. S. Dunham. The 68-page book summarizes the literature on 2,4-D, IPC,2,4,5,-T, "Methoxone" and other herbicides. Following this, there is a complete bibliography on herbicides, said to be the most complete ever compiled on the subject. The bibliography is for sale by the University, Campus Book Store, St. Paul 1, Minn. Price is $1.25 for mail orders.

Fertilizer Applicator is Announced

Baughman Manufacturing Co., Inc., Jerseyville, Ill. has announced a new fertilizer sprayer attachment for its models "K" and "K-2" bodies. The new device, designated as "Model 235" prevents the wind and air from getting to the material being thrown by the distributor, confines the usual airblast and directs it through a tapered fan-shaped cover which directs the material outward and downward to the ground. Both fine and coarse particles are evenly distributed, the makers state. Use of the new attachment will permit limestone to be thrown 30 feet, and ordinary fertilizer, such as phosphate, approximately 20 feet. The attachment folds to less than 8 feet for highway travel.

Technical Briefs

DDT Reduces Lygus Bugs

DDT dusting of alfalfa seed plants will reduce *Lygus* bug damage without destroying the pollinating bees, according to a recent USDA Bulletin. This makes it possible to get a paying crop of seeds, and also to meet the production of 60,000,000 pounds of alfalfa seed needed for United States plantings each year. By proper application of DDT dust in localities where domestic or wild bees are numerous, it is possible, they say, to produce at least double the usual yield of 150 pounds of seed per acre.

The threshings from DDT-dusted alfalfa seed crops should not be fed to dairy animals or to meat animals that are being finished for slaughter, however, because of the danger of contaminating milk and meat.

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Insecticides on Leaves

Laboratory tests of the effect of benzene hexachloride, DDT and derris powder applied in various concentrations on potato leaves indicated the BHC to be very potent, inhibiting feeding at .06%; DDT gave good results; derris powder reduced the damage to leaves at concentrations of .12 to .25% rotenone but had slight lethal effect. Tests with phenothiazine gave unsatisfactory results.

The vapors have no effect at temperatures to 25 degrees, also, the full grown adult larvae are less susceptible to the insecticides, as they stop eating. A more pronounced effect is expected on the pupae and the hatching adults. *Landbouwk Tydschr.* 61, 233-44 (1949).

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Deer Repellent by Plane

The effectiveness of a chemical deer repellent manufactured by B. F. Goodrich Chemical Company, was tested recently in an experimental airplane crop dusting run by the Fish and Game Department of the State of New Hampshire. Using eight pounds of the company's "Good-rite z.i.p." to 40 gallons of water, the plane cruised over 21 acres of beans with spraying jets set at five gallons per acre.

According to the New Hampshire report, airplane spraying is a satisfactory method of applying the chemical repellent which discourages deer from invading fields of crops. The product is a special formulation which depends upon taste for its repellent action. Deer are said to find "z.i.p." sprayed leaves so unpalatable that they spit them out.

•

Tenn. Tests Toxicants

Tests at the Tennessee station with three new insecticides for control of Mexican bean beetle, showed that rotenone is still the most effective insecticide for this purpose. The new materials in the tests included toxaphene (20 percent), parathion (0.25 percent) and the methoxy analog of DDT (5 percent), but further details are not given in the report.

Tests with 3 percent DDT against tomato fruit worm confirmed previous tests which had shown a reduction in yield, but the cause of the reduction was not determined. Excellent results were obtained, however, with DDT, although cryolite used in a dry bait was "just as good."

Tests were run at the Tennessee station to learn if the organic phosphates might have value in control of tobacco hornworm, for which lead arsenate has long been the standard insecticide. A dust of 0.25 percent parathion killed the worms in three hours, but neither hexaethyl tetraphosphate nor tetraethyl pyrophosphate was effective at this dosage. Dilutions of parathion as high as 1 to 8,000 also showed toxicity. A preliminary M.L.D. of .001 mg. per gram body weight was obtained. This, it is pointed out, compares with 0.014 mg. for paris green and 0.16 mg. for lead arsenate, indicating that this organic phosphate is 14 times more toxic than paris green and about 130 times more toxic than lead arsenate. Parathion, the report states, is not likely to present a residue problem, because of its low vapor pressure. When exposed to the air it retained its toxicity for about 5 to 6 days, but at the end of two weeks a 1 to 4,000 dest was no longer effective, the toxic element having evaporated.

From these tests it was concluded that parathion "shows promise of becoming an excellent insecticide for tobacco insects. It is extremely toxic to a wide range of insects and does not appear to present a residue problem."

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Florida Grasshopper Tests

At the Florida Agricultural Experiment Station, Gainesville, Fla., field and cage tests were made with three insecticides for control of eastern lubber grasshopper. In the field tests "Isotox" (1.5 percent gamma-isomer), chlorinated camphene, 20 percent, and chlordane, 5 percent were used. Chlordane, says a brief note in the station's annual report, did not produce as effective control as did the other two materials, which gave about equal results. In the cage trials at Gainesville toxaphene, 20 percent, chlordane, 5 percent, and parathion, 1 percent dusts were used. Final mortalities from the three materials were nearly equal but chlordane acted more slowly and a longer period of exposure was required.

In tests at Gainesville of pneumatic insecticide spray equipment a one-row experimental tractor was used in several experiments. Functional parts of this unit, from the spray standpoint, were a forage fan, a poston air pump and primary pneumatic nozzles, attached to a combination of large air nozzles, angled directly across the crop row.

Studying results, it was indicated that the test unit, using three gallons of concentrated insecticide, gave results very nearly comparable to those obtained with conventional equipment using 70 to 100 or more gallons of diluted insecticide material per acre.

early application of

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Velsicol chlordane formulations provide necessary protection against soil infesting insect pests destructive to many agricultural crops, such as corn, potatoes, tobacco and sugar cane.

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INDUSTRY NEWS

Western Spray Meeting

The 24th annual Western Cooperative Spray Conference was scheduled to be held at the Imperial Hotel, Portland, Oregon, January 5-7, according to Fred L. Overley, director of the tree fruit experiment station in Wenatchee, Washington, and secretary of the conference.

The meeting on the afternoon of Thursday, as well as the meetings scheduled for Friday and Saturday mornings, were to be open to research workers of the U.S.D.A. and to the experiment station workers from the states of Washington, Oregon, California, Idaho, Montana, Utah, Colorado and the province of British Columbia, as well as other states.

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Aldrin & Dieldrin Chosen

Two new coined names for insecticides have been announced by the Interdepartmental Committee on Pest Control, according to an announcement by Dr. S. A. Rohwer, assistant chief, Bureau of Entomology and Plant Quarantine, U.S.D.A., committee chairman. The two new names are "dieldrin", for an insecticidal product containing 1,2,3,4,10,10-hexachloro-6,7 - epoxy,1,4,4a,5,6,7,8,8a - octahydro - 1,4,5,8 - dimethanonaphthalene, and "aldrin", for an insecticidal product containing 1,2,3,4,10,-10-hexachloro - 1,4,4a,5,8,8a - hexahydro-1,4,5,8-dimethanonaphthalene.

Dieldrin is the coined name for "Compound 497", produced by Julius Hyman & Co., Denver, Colo. It is a coined common name for a specific product, and should be used as a common name, the announcement reminds. The name is based on the name of the chemist, Diels, who has been associated with chemical investigations which developed a chemical synthesis known as the Diels-Alder condensation.

Aldrin is the coined name for "Compound 118", produced by Julius Hyman & Co., Denver, Colo. It, too, is to be used as a common name.

B. P. I. Forms New Weed Control Division

THe U. S. Department of Agriculture has announced the formation of a new division for investigations in weed control. Dr. Roy L. Lovvorn, Raleigh, N. C., has been named to head the new division. Dr. Robert N. Salter, chief of the Bureau of Plant Industry, Soils and Agricultural Engineering explained the operation of the new division as follows:

"Weed problems of all crops will be integrated under the direction of this unit. None will be neglected insofar as funds permit. All work on weed research in the Bureau, regardless of crops involved and including weed control machinery will be coordinated by the head of the new division . . ."

In introducing Dr. Lovvorn, Dr. Salter stated that the division head is well known for his leadership in research on pasture management in North Carolina. Dr. Lovvorn is a native of Alabama, and holds degrees from Alabama Polytechnic Institute, the University of Missouri and the University of Wisconsin. For the past five years he has been responsible for the supervision and direction of the cooperative pasture management investigations between the B.P.I. and the N. Carolina Agricultural Experiment Station.

The Bureau's work in weed control is being strengthened at two points in the field, Dr. Salter stated. In New Jersey where a half-time position has been increased to full-time; and at the Delta Branch Experiment Station, Stoneville, Miss., a full-time position is being set up for investigations in the control of grass weeds in cotton.

•

N. E. Weed Meeting

The Northeastern States Weed Conference was held at the Hotel New Yorker, New York, January 3-5. Officers elected for 1950 were H. L. Yowell, Esso Laboratories, Elizabeth, N. J., president; Dr. S. M. Raleigh, Pennsylvania State College, State College, Pa., vice-president; and Walter C. Jacob, Long Island Research Farm, Riverhead, L. I., N. Y., secretary, treasurer. A complete account of the meeting will appear in the February issue.

MEETINGS

University of Illinois Spray School. Urbana, Ill., January 17-19.

Texas Entomological Society, Rice Hotel, Houston, Texas, January 19 & 20.

Southern Association of Science and Industry, Hotel Roosevelt, New Orleans, La., January 23-24.

Western Weed Control Conference, Denver, Colorado, January 31 to February 2.

Purdue University Pest Control Conference Lafayette, Ind., February 6-10.

Association of Southern Agricultural Workers and Southern Weed Control Conference, Biloxi, Miss., Feb. 8-10.

12th Annual Kansas State Weed Conference, Topeka, February 15 and 16.

Midwestern Shade Tree Conference, La Salle Hotel, Chicago, February 15-17.

Kansas State Weed Control Conference Topeka, Kan., February 15 & 16.

North Central Branch, A.A.E.E., President Hotel, Kansas City, Mo., March 23 & 24.

National Fertilizer Association — Greenbrier Hotel, White Sulphur Springs, W. Va., June 12-14.

Pacific Slope Branch, A.A.E.E., Hotel Casa del Rey, Santa Cruz, Calif., June 14, 15 & 16, 1950.

F. D. A. Hearings

The Food and Drug Administration Hearings to establish tolerances for residues of economic poisons on fruits and vegetables, were to get under way in Washington, D. C. on January 17. Bernard D. Levinson was scheduled to be the presiding officer.

The first phase of the hearings was to deal with the necessity for using added substances for controlling pests which interfere with the production of fresh fruits and vegetables. Opening testimony was scheduled to come from representatives of the U. S. Department of Agriculture, followed by representatives of state agencies and later by growers' associations.

A summary of the first several days of the Hearings will appear in the February issue of **Agricultural Chemicals.**

Joins Pittsburgh Agri.

Pittsburgh Agricultural Chemical Co., New York has announced the appointment of W. Scott James to handle the company's east coast sales and to be responsible for the registration of labels for the firm. He

W. Scott James

will also produce technical and popular bulletins on rodenticides, insecticides, fungicides and herbicides manufactured by the company.

Mr. James is a native of Maryland, and is a graduate in entomology of the University of Maryland. He was connected with the Micronizer Co. at Moorestown, N. J. for a number of years, and later became general manager of the Central Chemical Corporation of Virginia, at Harrisburg, Va.

•

Kansas Weed Conference

The 12th annual Kansas State Weed Conference will be held at Topeka on February 15 and 16, according to T. F. Yost, Topeka, State Weed Control Supervisor of Kansas. The preliminary program called for a talk on spraying weeds in crops, by W. H. Phillips, USDA, Hays, Kansas; "Spraying Perennial Weeds," Vernon Woestmeyer, Kansas State College; "Sprayer Machine Problems," by Prof. G. E. Fairbanks, Kansas State College; "Problems of the Custom Ground Spray Operator," by Robert Jennings, Overland Park, Kansas; "Spraying Roadsides," by J. L. Hutchison, assistant State Weed Supervisor, Topeka; a panel discussion on Johnson grass led by Dr. Yost; and "Volatilization and Drift," by George McCall, E. I. duPont de Nemours & Co. The annual banquet will be held on the 15th, with Charles Gilbert, South Dakota State Weed supervisor as speaker. Dr. Harold Myers, Kansas State College will be toastmaster.

•

Discovers New Fungicide

Development of a new agricultural fungicide said to be effective against fungus diseases attacking fruits, vegetable crops and certain plants has been announced by the Standard Oil Development Company. The product, "SR-406," was developed after several years of intensive cooperative research between the Esso Laboratories and Rutgers University. The material was then placed under field test for three years by several agricultural experiment stations in the United States and abroad.

The tests showed promising control of a wide variety of diseases including those of apples, peaches, cherries, celery, tomatoes, potatoes, carrots, chrysanthemums, carnations, and roses. The new material is of special interest because of its high potency on fruits and it has also been tested successfully on bananas and cacao in the tropics.

Manufacture and distribution of the new fungicide is to be handled by the California Spray-Chemical Company, Richmond, Calif., which has been licensed to conduct these activities.

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Wolf Joins duPont

Dr. Dale E. Wolf, associate research specialist in weed control at Rutgers University, New Brunswick, N. J., has announced that he would join the staff of E. I. duPont de Nemours & Co., Inc., Grasselli Chemicals Department, in Wilmington, Del. on January 15. He will be in charge of herbicide research for the Department.

Dr. Wolf has been prominent in weed control activities at Rutgers, having helped pioneer in pre-emergent studies, and aided in the organization of the Northeastern Weed Control Conference of which he is now secretary-treasurer.

Baxter to Coke Oven

Coke Oven Ammonia Research Bureau, Columbus, Ohio, has announced the appointment of Aaron Baxter to its staff as Southern agronomist. The appointment was effective in November, the company says. Mr.

Aaron Baxter

Baxter is a native of Alabama, and is a graduate of Ala. Polytechnic Institute. He had several years of experience in soils work before entering Ohio State University for further study in agronomy. He has now completed research requirements for his Doctorate degree. While at Ohio State, he conducted extensive research in the field of soil fertility, with emphasis on the study of magnesium.

•

Pring Heads Dust Div.

Robert T. Pring has been appointed Technical Director of the Dust and Fume Division of American Wheelabrator & Equipment Corporation, Mishawaka, Indiana, effective January 1, the company has announced. Mr. Pring holds a degree in Chemical Engineering from Tufts College.

•

Wilson T. Lundy Retires

Wilson T. Lundy, active in the American sulphur industry for over a quarter century, has retired as vice-president of Freeport Sulphur Company, the company has announced. He will continue as a member of the board of directors, and his services will be available in a consulting capacity.

Starnes to Rutgers Post

The extension service of the Rutgers University College of Agriculture has recently announced the appointment of Ordway Starnes as Associate Extension Specialist in Entomology. He will make his headquarters at Rutgers University, New Brunswick, N. J.

Ordway Starnes

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Penick Renews Lease

S. B. Penick & Company have just completed the renewal of a long term lease for their Chicago Branch Office and plant at 735 West Division Street, which premises they have occupied for the past ten years.

This branch serves Midwestern customers with botanicals, and is also the headquarters for the Midwestern branch of the New York Quinine and Chemical Works, Inc.

•

Illinois Spray School

Scheduled to be held from January 17 to 19, the second annual Custom Spray Operators' Training School at Urbana, Illinois was to include discussions on toxicity, application equipment, plant diseases, reports on pest control, herbicides, and on laws which affect the custom operator. According to Dr. H. B. Petty, University of Illinois, the registration was expected to be around 400.

Specific study was to be made on the toxicity of certain products to the operator and to animals, according to the advance program. Chemicals to be included in this category were parathion, dieldrin ("compound 497"), aldrin ("compound 118"), lindane, DDT, calcium cyanide, 2,4-D and 2,4,5-T. Weed control chemicals, and weed control in general were to be discussed on the final day of the meeting.

A complete report of the meeting is expected to be carried in the February issue of *Agricultural Chemicals*. A representative of the magazine was to attend the sessions.

•

Expands Organization

John Powell & Co., Inc., New York, manufacturers of insecticide concentrates, have announced a new program designed to meet the expanding needs of the insecticide trade by furnishing regional sales and service facilities. It is a continuation of the expansion plan which included the acquisition of a plant and warehouse in Huntsville, Alabama, during 1949.

Powell's present New York plant will concentrate on serving the Northeast. The new Huntsville plant will provide extensive stocking facilities for the Southeast. Warehousing in Chicago will serve the Middle West. The present Fort Worth stocking point will concentrate on the South and Southwest.

To assure prompt deliveries in Western States, Powell materials will be stocked and shipped out of warehouses in San Francisco and Denver.

The firm has also announced shifts in personnel to facilitate the new program, according to H. Alvin Smith, executive vice-president. The key personnel involved in the move include Harold Straube, long assistant sales manager, who will open sales offices in the Huntsville, Ala. plant of John Powell Chemical Co., and will be in charge of all sales operations in the southeast. John Stoddard has been advanced to assistant sales manager, with headquarters in New York. He will be responsible for servicing all sales not handled by the new regional sales offices.

Morton Bader has been appointed chief chemist at the Huntsville plant, and Paul Williams, formerly associated with the firm in a sales capacity, has been added to the Chicago staff.

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New Dow Salesman

Frank A. Ratajczak will represent The Dow Chemical Company's agricultural chemical sales division in Wisconsin, Eastern Minnesota, and part of Michigan's Upper Peninsula, it has been announced by W. W. Allen, manager of the division. Mr. Ratajczak, born in Kewaunee County, Wisconsin, was educated at the University of Wisconsin where he received his B.S. degree in agriculture. He will work out of the Dow Chicago sales office.

Frank A. Ratajczak

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Tex. Entomology Meeting

The Texas Entomological Society was to meet at the Rice Hotel, Houston, Texas, on January 19 and 20, discussing broad topics including the development of new insecticides; cotton insect control, control of insects affecting other crops, and control of livestock insect pests. J. C. Gaines, College Station, Texas, chairman of the program committee, stated that the annual banquet would be held on the evening of Jan. 19, with Horace W. Lee, Niagara Chemical Division of Food Machinery Corp., toastmaster. Principal speaker at the banquet was to be Dr. V. P. Lee, president of the Production Credit Corporation of Houston.

Covering the subject of development of new insecticides, were to be speakers representing manufacturers, research groups, insecti-

cide blenders, and extension entomologists, each presenting reports of developments from his own standpoint.

Discussions on cotton insect control were to include appraisals of toxicity of the newer insecticidal materials, comparisons of schedules of applications for control of boll weevil and other cotton insect pests; and comparative reports on the value of spraying versus dusting for best control of insects affecting cotton. Control of insects on other southern crops will also be discussed at length, Mr. Gaines reported.

Control of insects affecting livestock was to occupy the final sessions of the meeting at Houston. This topic was to include a resume of the toxicity of new compounds, both as regards the pest itself, and the animal being treated. Considerable amount of importance was attached to this phase of the program, because of the interest in livestock pest control in the state.

Officers for 1949 were Cameron Siddall, Bryan, Texas, president; H. G. Johnston, Texas A & M College, College Station, Tex., vice-president; and L. F. Curl, B.E.P.Q., San Antonio, secretary-treasurer.

Multi-wall Prices Cut

A substantial increase in the volume of multi-wall paper bags used, a highly competitive market, and a series of price cuts which have reduced costs to buyers almost twenty percent are reported in a review of the market outlook for this industry in the January 10th issue of the *Wall Street Journal*.

Output of multi-wall paper bags reached a total of 1,800,000,000 units, worth more than $150,000,000 in 1948, the report states, as compared with about 500,000,000 units in 1940. As the field has broadened, more paper companies have started making this type bag. Crown Zellerbach in 1948, and five others in 1949 including Negley Bag Co., West Monroe, La., and Fulton Bag Co., New Orleans. Virginia Carolina Chemical Co. of Richmond, Va., besides making fertilizer bags for its own use, is now marketing them as well. Hudson Pulp & Paper, it is reported, will be in operation on multi-walls in February at its plant in Palatka, Fla., while Chemical Packaging Corp. is reported ready to start production at Savannah, Ga.

The price cuts, which featured the year-end contract season, were touched off, the *Journal* reports, by one of the newcomers in the multi-wall field underquoting established prices in order to line up new accounts. The price reductions were met promptly by established factors in the field, and price drops up to twenty percent have been reported on multi-wall bags for use in the agricultural chemical field.

Burlap Supply Improves

Steps have been taken to head off a threatened shortage of burlap bags in the U. S., according to reports from Calcutta. American supplies of burlap had been seriously threatened by currency devaluation in India, trade controls, etc. The U. S. Consul at Calcutta is reported recently to have worked out an agreement with the Government of India and the India Jute Mill Association to supply the U. S. with 25,000,000 yards of burlap at once. With the resumption of normal trade it is hoped that the threatened shortage may be averted.

Develops New High-Clearance Sprayer & Duster

A new high-clearance spraying and dusting unit which permits application of insecticides to full-grown sweet and field corn without damage to the crop, has been developed by the University of Maryland. Under the direction of Dr. Ernest N. Cory, State Entomologist, and his assistant, Dr. George S. Langford, the machine was assembled with the cooperation of W. W. Tranter of the A. B. Farquhar Co.

The tractor with its attached spraying and dusting mechanism was elevated by special stilts, angled backward to extend the wheel base to provide stability and safety. The dusting mechanism is a standard power-driven crop duster attached to the tractor. The spray mechanism operates from a power take-off and is engineered to apply insecticides as concentrates with from 5 to 50 gallons of water per acre and at pressures of from 50 to 400 pounds.

Numerous difficulties were encountered in the development of the machine, it is reported, but one by one they were overcome. Three Maryland county agents were largely responsible for the continuance of the project. They are O. W. Anderson, W. G. Myers and H. R. Shoemaker who repaired mechanical breakdowns of the machine and sprayed over 4,500 acres of corn in less than 60 days.

Development of the high clearance long wheel base tractor is termed an "outstanding achievement" by the University.

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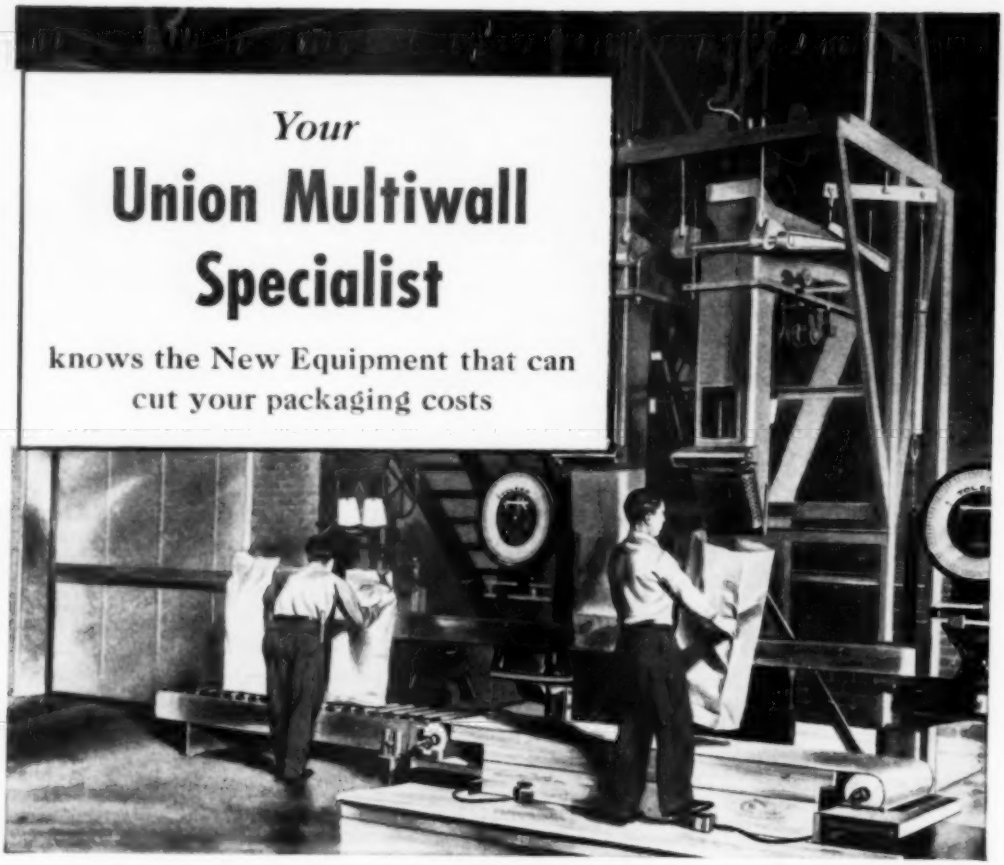

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Pinckard Joins Hyman

Julius Hyman & Company, Denver, Colorado, has announced that Dr. J. A. Pinckard, Plant Pathologist, is now associated with the Company. For the present, he will

DR. J. A. PINCKARD

devote his attention to screening new fungicides, bactericides and nematocides being developed in the Hyman Laboratories, the company states.

Dr. Pinckard received his Ph.D. from the University of Wisconsin in 1934 and since that time has served as plant pathologist with the Virginia, North Carolina and Mississippi Experiment Stations and later was field pathologist for Rohm & Haas Company.

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Western Weed Program

Although the entire program was not complete at press time, sufficient information was available to indicate that the Western Weed Conference will be an outstanding event when it is held in Denver, Colo., January 29 to February 1. According to Walter S. Ball, Sacramento, California, secretary of the group, the meeting will be held at the Cosmopolitan Hotel. Committee meetings will occupy all of January 29, continuing through the morning of Jan. 30. Afternoon the second day, the formal program will get under way. The research section of the Conference is expected to appear early on the program. This will include papers on "The Control of Perennial Weeds" by C. E. Tinghey, and F. L. Timmons, U.S.D.A., Logan, Utah; "Soil Sterilization," by C. I. Seely of Idaho; and "The Use of Growth-Regulating Compounds" by Bruce Thornton of Colorado and Dale Bohmont of Wyoming.

The second phase of the program will be "Control of Annual Weeds in Crops by Selective Herbicides," which will cover a number of appropriate topics including "Control of Weeds in Grain," by R. L. Warden, Montana; "Control of Weeds in Legumes," by Virgil Freed of Oregon; "Weeds in Vegetables," by J. H. Robertson of Nevada; "Control of Weeds in Beans and Potatoes," by Lambert Erickson of Idaho; and "Control of Weeds in Vineyards," by W. W. Robbins of California.

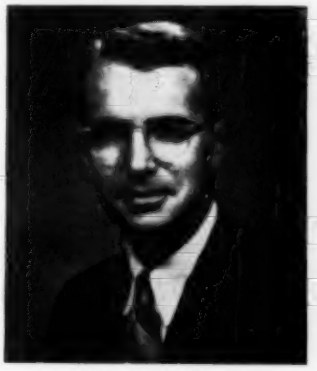
TVA Reports to Congress

Tennessee Valley Authority has reported to Congress that its chemical plants produced 158,700 tons of triple superphosphate during the fiscal year of 1949; 3,500 tons of calcium metaphosphate fertilizer; 15,200 tons of fused tricalcium phosphate; 36,600 tons of dicalcium phosphate for stock feed supplement and 151,200 tons of ammonium nitrate fertilizer.

The report also stated that nearly 1,200 new test-demonstration farms were established during the year under auspices of state agricultural extension services, to use TVA fertilizers. About 7,400 test farms in all used TVA fertilizer materials during the year.

Hercules Sends Rapp & Both Abroad for Study

FRANK U. RAPP



RICHARD J. BOTH

Hercules Powder Co., Wilmington, Del., announced early this month the departure of Frank U. Rapp, supervisor of toxaphene sales and Richard J. Both of the toxaphene sales staff to distant points to investigate potentialities of insect control on crops and livestock. Mr. Both was to leave on January 3 for Africa, and Mr. Rapp on January 8 for South America.

Mr. Rapp's trip will include visits to Venezuela, Peru, and Brazil. Mr. Both will begin his African trip in Johannesburg, Union of South Africa.

In Venezuela, Mr. Rapp will check on the progress of experiments on the use of toxaphene for livestock tick control, and will also observe results of that country's second year of applying toxaphene for cotton insect control.

In Peru, he will visit all of the nine irrigated valleys that run from the mountains to the coast, and where Peruvian cotton is being treated with toxaphene.

In Brazil, he will check on tests of toxaphene against insects that attack coffee, tobacco and rice, as well as on control measures taken against the berne and the tick. Mr. Rapp will also be studying results of Brazil's second year of using toxaphene on a large scale against cotton insects.

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Texas Fertilizer Meeting

The Department of Agronomy of Texas A & M College was to hold a fertilizer conference at College Station, Texas, on January 4th and 5th, which all fertilizer manufacturers, representatives, dealers and agents were invited to attend.

Dr. J. F. Fudge, professor in charge of Soil Chemistry and Fertility Investigations, stated that the program was to be devoted to topics of general interest to the trade on the opening day, with the second day given over to reports of fertilizer research conducted by workers of the Department of Agronomy and other substations of the Texas Agricultural Experiment Station.

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Int. Minerals Advances Rutland

John W. Rutland has been appointed general sales manager of the plant food division of International Minerals & Chemical Corporation, Chicago. Mr. Rutland joined the company in 1921 and has been sales manager of the potash division since 1948.

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CFA Selects Dates

The California Fertilizer Association, Los Angeles, has announced that its 1950 meeting will be held at the Coronado Hotel, San Diego, November 2, 3 and 4.

•

Iowa Fertilizer Conference

Iowa State College campus, Ames, was the scene on December 15 and 16 of the third annual fertilizer short course which attracted registrants from many parts of the U. S. Included on the program were talks by Dr. M. H. McVickar, agronomist, National Fertilizer Association, and by Dr. J. R. Taylor, Jr., agronomist, American Plant Food Council, both of Washington, D. C. Dr. McVickar presented the NFA movie, "What's in the Bag," and Dr. Taylor spoke on "Your Job as a Fertilizer Dealer."

Research results on fertilizers were presented as follows: corn and soybeans, by L. C. Dumenil; legumes and grasses, H. R. Meldrum; small grain, W. L. Pritchett; and fundamental research relating to fertilizer use, W. H. Allaway. H. B. Cheney discussed phosphate fertilizers, and H. E. Hazen, chairman of the Iowa State Production and Marketing Administration Committee, explained how the PMA encourages the use of lime and fertilizer in Iowa.

The meeting terminated with the recommendations for 1950 fertilizers use. These were presented by M. A. Anderson, W. H. Sholtes, W. H. Allaway, H. B. Cheney, R. C. Gray, D. A. Russell, A. R. Aandahl, J. W. Fitts, G. D. Smith, C. A. Black, H. R. Meldrum, V. K. Webster and F. F. Riecken.

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Pa. Fertilizer Meeting

A conference for fertilizer salesmen is scheduled to be held at Pennsylvania State College, State College, Pa., January 30 and February 1. The group will discuss the role of mineral elements, plant nutrition, minor elements, behavior of nutrients in the soil, deficiency symptoms, fertilizer recommendations, plant-tissue tests, grades and ratios of fertilizer, organic matter, manures, fertilizer application methods and rotations.

To Re-Open Potash Mines

The strike which has closed the potash mines of three major producers since November 19, 1949, was still in effect as we went to press, although producers were reported to be preparing to open the mines again, following issuance of an injunction restraining mass picketing. The halt called by Local 415 of the International Union of Mine, Mill and Smelter Workers (CIO) affects the mines of U. S. Potash Company, Potash Company of America, and the International Minerals & Chemical Corp.

The National Labor Relations Board obtained the injunction from a Federal Court in Albuquerque, N. M. restraining pickets from blockading mine entrances. It was charged that a shortage of potash, with the planting season only a few weeks away, threatened a national crisis. The decision to reopen the mines followed issuance of the injunction.

The original cause for the walkout was the Union's demand for a 25c per hour increase in pay. Since then, the picture has become complicated since the contracts held by the three companies were cancelled when the workers struck. The contracts were to be in effect until June 1, 1950, company spokesman said.

C. Gran Joins Mathieson

C. G. Gran has been appointed manager, Agricultural Sales Development, Mathieson Chemical Corporation, Baltimore, Md., according to S. L. Nevins, vice-president and director of Agricultural Chemical Sales for the firm.

CEDRIC G. GRAN

Mr. Gran, formerly assistant to the president of the American Plant Food Council, Inc., Washington, D. C., is a graduate of De Pauw University, Greencastle, Indiana. Former business connections include Virginia-Carolina Chemical Corp., Richmond, Va., Pin Money Brands, Inc., a food products concern; and the Office of Price Administration where he was Price Executive, Agricultural Chemicals Section.

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FTC Fertilizer Report

The Federal Trade Commission has just completed an investigation of the fertilizer industry and has issued a report said to be highly critical of the costs of fertilizer distribution and of the alleged attempts of some of the larger producers to dominate the pricing practices of smaller competitors. The FTC stated that its studies show costs of distributing fertilizers are high largely because mixers adhere to long-standing formulas that provide for the use of high percentages of inert ingredients.

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Stauffer Houston Plant

Stauffer Chemical Co., New York, plans construction of a sulphur and insecticide plant at Houston, Texas.

Ohio Conference Held

The Ohio Fertilizer Conference was held at Columbus, O., December 2, with discussions on soils, nutrition, fertilizer usage in the North Central States, and reports on results of fertilizer use on corn crops. Speakers included J. D. Sayre, G. W. Volk, J. B. Page, W. P. Martin, M. A. Bachtell, Zene Beers, Victor E. Kierns, Chester E. Evans, D. R. Dodd. A question-and-answer session was held in the afternoon as the final event of the conference.

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Cyanamid Drops Price

American Cyanamid Co., New York, has announced a reduction in prices of both cyanamid and "Aeroprills" ammonium nitrate fertilizer, effective December 1. The old price of granular cyanamid (in 100 pound bags) was $64.75 per ton, at the plant in Niagara Falls, Ont. The new price is $48.00 per ton. Pulverized cyanamid, dropped from $2.75 per unit of nitrogen, to $2.55. Ammonium nitrate fertilizer was priced at $63 per ton at the plant at Pt. Robinson, Ont., but is now quoted at $57.50. (Packed in 100 pound bags.)

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Nitrogen Use Increases

Higher world production and greater consumption of nitrogen were noted in the recent report of the British Sulphate of Ammonia Federation. Production was 4,152,100 metric tons as compared to 3,561,800 tons the year before.

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Correction Noted

We regret a typographical error in our November issue which stated that "nine of the new fungicides tested . . . were better than bordeaux . . ." The word "nine," should have been "none." This was part of the Technical Briefs section appearing on pages 50 and 51 of that issue.

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Becomes Sales Represent.

J. H. Hoeffler has announced that since January 1, he is acting as Manufacturers Sales Representative for American Cyanamid Company and the Nott Manufacturing Company. He is making his headquarters at 333 Thompson Ave., Roselle, N. J., at present.

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On Job Fifty Years

George A. Bratt, Sr., president of Griffith & Boyd Co., Baltimore, Md., recently observed his fiftieth anniversary with the company. The event was marked at a luncheon in Baltimore, attended by representatives from all of the local manufacturers and others affiliated with the industry in that area. Visitors included Dr. Russell Coleman, president of the National Fertilizer Association, who was a guest of J. E. Totman, president of Summers Fertilizer Co., Baltimore who gave the luncheon in Mr. Bratt's honor.

The firm of Griffith & Boyd is one of the oldest manufacturers in the industry, having been formed in 1887. Mr. Bratt joined the company in 1899 as a stenographer and clerk. He advanced steadily, being named president in 1936. He has held the position since, and states that he has no plans for retiring.

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Wilson to C. S. Board

J. Albert Woods, president of Wilson & Toomer Fertilizer Co., Jacksonville, Fla., has been named a director of the Commercial Solvents Corporation. Mr. Woods is also a director of the company which he heads; is chairman of the board of the Southern States Bag Co., a director and member of the executive committee of the Barnett National Bank in Jacksonville; and a director of the American Plant Food Council.

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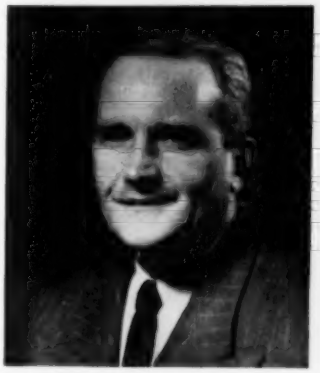
Winship P-D Salesmgr.

C. H. Winship, Jr., has been appointed Sales Manager for Phelps Dodge Corp. and Phelps Dodge Refining Corp. to succeed Martin H. Crego who retired January 1, after fifty seven years of service.

Mr. Winship entered Phelps Dodge in 1946. He attended Telluride School at Deep Springs, California and Cornell University, and is a Navy veteran of both world wars. Prior to world war II, Mr. Winship was President of the Haydon Manufacturing Co., Inc., Forestville, Connecticut.

To Shell's East Div.

Shell Chemical Corporation has announced that Barclay K. Read has resumed the duties of assistant



BARCLAY K. READ

sales manager of the Eastern division, after two years in the management of Western division sales.

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Defoliation Conference

The fourth annual Belt-Wide Cotton Defoliation Conference was to be held at the Peabody Hotel, Memphis, Tenn. January 12 & 13. The event was expected to bring together personnel engaged in cotton defoliation work, both in Government and private projects.

Presiding officers for the meeting included Dr. W. H. Tharp, Fayetteville, Ark., senior physiologist, division of cotton and other fiber crops, USDA; Tildon Easley, Little Rock, Ark., agriculturist, American Cyanamid Co.; Dr. F. T. Addicott, professor, botany department, University of California; Dr. Thomas Kerr, Washington, senior cytologist, division of cotton and other fiber crops, USDA; and William E. Meek, Stoneville, Miss., senior agricultural engineer, Delta Branch Experiment Station.

RECOMMENDATIONS

(*Continued from Page 28*)

fleahopper, thrips, and certain spider mites, and should be further tested.

Tetraethyl pyrophosphate is highly toxic to warm-blooded animals, therefore, it should be used with extreme care. It

deteriorates very rapidly when exposed to moisture or moist air and is incompatible with alkaline materials. The residual toxicity of this chemical is very short.

Toxaphene

Toxaphene, called "chlorinated camphene," in the report of the Baton Rouge Conference (1948), will control the boll weevil, bollworm, fall armyworm, cotton fleahopper, thrips, cotton leafworm, and grasshoppers. Two to three pounds of the technical material per acre, used either as a dust or spray, will control all all these pests satisfactorily. Thrips and cotton fleahoppers may be controlled with as little as one-half pound of the technical material per acre.

Where toxaphene was used throughout the season, satisfactory supression of the cotton aphid resulted. It will not, however, control heavy aphid infestations. It will not control red spider mites, and its use may result in their increase; therefore, in some areas it is recommended that the dust contain at least 40 percent of sulfur.

Inherent difficulties are encountered in making satisfactory dusts and emulsion concentrates with toxaphene. Processors and mixers are therefore urged to place on the market only formulations suitable for agricultural use.

No economic injury to cotton has been reported from the use of toxaphene. This material can be handled with relative safety to the operator if proper precautions are taken. Toxaphene is toxic to livestock and poultry, and is very toxic to fish.

FUNGICIDES

(*Continued from Page 49*)

nuts were free from scab, most contained well-filled kernels.

The authors call attention to certain striking differences in results at the two locations. Bordeaux mixture gave good control at both; however, at Orangeburg, Bordeaux-sprayed nuts showed many split shells and were not so large as those from "Zerlate" plots. Since it has been observed that in dry weather Bordeaux often reduces the size of the nuts, it is possible that small nuts were produced on the Bordeaux-sprayed trees at Orangeburg, and that over-filling of the small nuts caused splitting of the shells. At the Edisto Station, "Zerlate" gave very poor control in contrast to the effective control obtained with this material at Orangeburg. It is suggested that this difference in control with "Zerlate" was due, in part, to the heavier rainfall at the Edisto Station, and was associated with the poorer sticking qualities of "Zerlate" as compared with Bordeaux mixture.

The number of pecans per pound did not seem to be correlated with the amount and severity of scab infection. Several factors may have entered into the effect of scab, such as time and degree of infection in relation to stage of nut development. Moisture and temperature during the growing season are also important. Control of scab on Schley and other scab-susceptible varieties is necessary, but unless it is coordinated with improved orchard management and proper fertilization, continuing yields of high quality nuts cannot be expected.

Conclusions from this experiment are that: 1—Bordeaux mixture

is an effective fungicide for the control of pecan scab; 2—"Copper-A," "Zerlate," and "Parzate" gave good control under the light-rainfall conditions of the Orangeburg plots; 3—"Zerlate" appeared to possess poorer sticking qualities than Bordeaux mixture; 4—rainfall during the growing season is of primary importance in relation to the development of scab.

Brown Rot Control

H. H. FOSTER of the South Carolina Agricultural Experiment Station reports that eight different treatments were evaluated for field, storage, and transit control of peach brown rot, caused by the fungus *Monilinia fruticola*.

The schedule included 10 applications, as follows: 3 blossom sprays, on March 18, 20, and 22, petal-fall on March 25, calyx drop on April 15, and 5 cover sprays, first on April 26, second May 10, third May 31, fourth June 18, and fifth July 6. Sprays were applied with a four-nozzle boom at about 600 pounds pressure. Treatments and results are given in Table 2.

Lead arsenate induced some foliage injury in the form of spray burn and shot-hole. "Phygon X-L" as used in the first two cover sprays, in Treatment 5, caused moderate chlorosis and slight leaf drop, also, the surface of many fruits appeared darkened and streaked; consequently the concentration was reduced for the third and fourth cover sprays. Similarly, in Treatments 6, 7, and 8, the strength of both "Zerlate" and "Parzate" were reduced for the last three cover sprays after slight foliage chlorosis appeared following the first two cover sprays. No definite fruit injury was observed from the use of "Zerlate" or "Parzate" or the combination "Zerlate"-"Parzate" spray.

Apparently very little infection had taken place during the blossom period. At a preliminary examination of peach fruit preceding harvest, on July 19, an occasional brown-rot infected fruit was observed on only 7 out of a total of 80 trees. On July 24, peaches from the spray treatments were harvested for shipping and storage tests.

After grading and packing, part of the peaches were loaded for railway shipment to Chicago. On arrival, July 28, the baskets were placed at a room temperature of 75-85°F. Final inspection was made on August 1. Brown rot was of commercial importance only on fruit receiving treatments number 2, 5, 7, and 8 (Table 2).

Two baskets from each spray treatment were placed in storage at Clemson College. One basket from each treatment was stored for 6 days at low temperature (36-45°F.), and then ripened for 3 days at room temperature (approximately 75-85°F.). The peaches showed very little brown rot after this period; the disease was of commercial importance only in Treatment 2 and 9 (Table 2).

The other basket from each treatment stored at Clemson College was kept at room temperature for 4 days; these showed an increase of brown rot during storage on fruit

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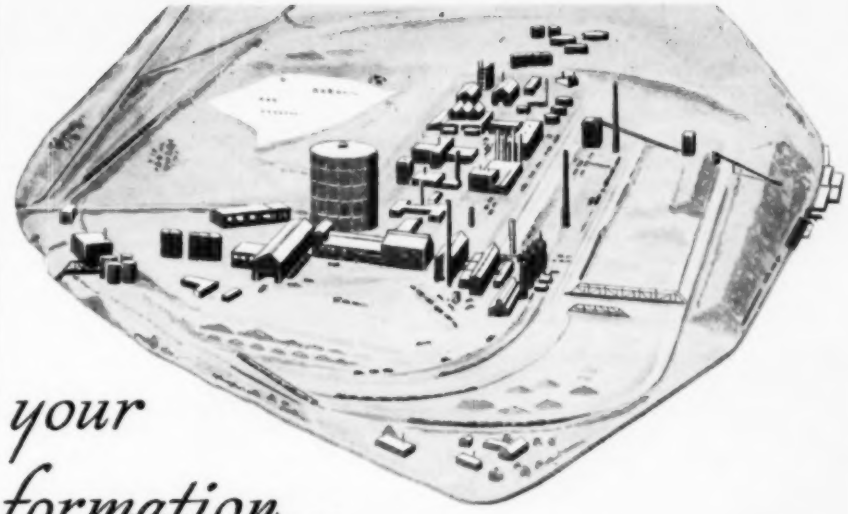

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from treatments, 2, 7, 8, and 9. Treatment 2 showed 7.7 percent brown rot, whereas treatment 3 showed only 0.5 percent (Table 2.). The additional sulfur spray in treatment 3 gave added control. The combination of "Zerlate" and "Parzate" used in treatment 8 did not give satisfactory control, although each material used by itself, in treatments 6 and 7, was fairly effective. Fruit from the commercially sprayed plot (treatment 9, sprayed with wettable sulfur) showed about 20 percent brown rot. The difference in brown rot control between the commercially sprayed and the experimentally sprayed sulfur plots appeared to be due to the better coverage given in experimental spraying.

PARATHION ASSAY

(*Continued from Page 53*)

lined above for evaporating the benzene, preparing the final solutions, and testing for toxicity, is then followed. The addition of extract of untreated plant tissue to the standard parathion solution was found necessary because the presence of plant tissue extract lowered the toxicity of the parathion to a slight extent.

The dose mortality curve for the standard is plotted as described for the treated sample, leading to an LD_{50} value for the standard expressed in micrograms of parathion per beaker. One microgram of parathion per gram of plant material is equivalent to one part per million. The fraction LD_{50} Standard (micrograms of parathion) / LD_{50} Sample (grams of plant material) gives the concentration of parathion in ppm.

The table on page 53 gives some representative results obtained by this method.

In cases where the sample is so low in toxicity that an LD_{50} value cannot be obtained, it is possible to calculate an upper limit for the parathion content by dividing the LD_{50} value of the standard by the largest value for the plant tissue used in grams per beaker.

Difficulty was experienced with some plant tissues such as shelled peas and potato tubers due to toxicity of the benzene extracts of untreated material.

The method is also of no use for material which may have been treated with more than one insecticide, and whose history is unknown. Experience obtained so far indicates that the method is suitable for concentrations of parathion as low as 0.02 P.P.M., with the limitations mentioned above.

References

(1) Averell, P. R. and Norris, M. V., Estimation of Small Amounts of 0,0-Diethyl,O p-Nitrophenyl Thiophosphate. Analytical Chemistry 20: 752-756, 1948.

(2) Bliss, C. I., The Determination of the Dosage-Mortality Curve from Small Numbers, Quart. Jour. Pharm. Pharmacol. 11: 192-216 (1938).

(3) Questel, D. D., and Connin, R. V., Jour. Econ. Ent. 40: 914-915, 1947. A Chemical Treatment of Soil which Produces Plant Tissue Lethal to European Corn Borer.

Phosphate Land Sale

A phosphate lease sale is scheduled to be held February 8, for ten units totaling more than 15,500 acres of land in Fremont County, Wyoming. The sale, to be held by the U. S. Department of Interior, is because of the increasing need for the development of western phosphate fertilizers, according to secretary Oscar L. Chapman. The land units, he said, average 1,500 acres in size, and bids must be submitted on each unit separately. However, no objection will be made to the awarding of more than one unit to the same successful bidder, it was pointed out. The sale is to be held at the office of the Bureau of Land Management, Department of the Interior, Washington, D. C.

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E. O. Kintzing Dies

E. O. Kintzing, general sales manager of the Southern Division of Swift and Company's Plant Food Division, died at Hammond, Indiana on November 28. Mr. Kintzing was well known in the fertilizer trade, and had attended the meeting of the National Fertilizer Association only two weeks before his death.

AAEE

(*Continued from Page 39*)

W. Poos of the B.E.P.Q, Beltsville. They reported that cows fed alfalfa treated with 2.4, 1.0 and 0.6 lbs. of DDT per acre produced milk containing 10.1, 6.0 and 0.9 ppm respectively of DDT. Alfalfa treated with 1½ lbs. of toxaphene or 1 lb. of chlordane per acre had a residue concentration of 87 and 24 ppm respectively of organic chloride content. When these hays were fed to cows, the milk contained only very slightly increased organic chloride content,—less than 1 ppm.

Insecticide residues on plants were discussed by Lauren D. Anderson, University of California, Citrus Experiment Station, Riverside, on the basis of recent studies there of both surface and penetration residues of parathion and DDT on many fruit, vegetable and field crops. Penetration residues were reported of little consequence except in citrus, olives and avocados, where approximately 1 to 6 ppm of parathion and 1 to 36 of DDT were found in the peel on citrus and avocados or in the pulp of olives. Within two to three weeks after applying recommended dosages of parathion, surface residues with but few exceptions were all below 2 ppm. When DDT was used at recommended dosages, surface residue at harvest time was in most instances below 7 ppm.

Resistance to Insecticides

ACQUIRED resistance to insecticides by insects was discussed in a series of five papers at the morning session, December 16. R. L. Metcalf of the University of California, delivered a paper of which A. M. Boyce was co-author, reporting on work with insecticide-resistant insects in California. Following discovery of the original Bellflower strain of houseflies which were more than 300 times as resistant to DDT as ordinary laboratory reared flies, this strain has developed an even further resistance as more generations have been exposed. They are now working with a "super" Bellflower strain, which Dr. Metcalf indicated can scarcely be killed by DDT at any concentration. Their studies suggest that flies which acquire resistance to one insecticide also tend to develop resistance to others. In recent work at Riverside, for instance, flies have been developing resistance to gamma BHC, he reported. Work with parathion has shown the same result, with a resistance of three to five times normal being built up at the end of four or five generations.

W. V. King of the B.E.P.Q., Orlando, Fla., reviewed work at the Orlando laboratory on the same subject, while S. W. Simmons of the U. S. Public Health Service, Savannah, Ga., also reported on "Resistance of Flies to DDT."

The following summary from the paper of W. N. Bruce and G. C. Decker, Natural History Survey, Urbana, Ill., "Studies of House Fly Tolerance for Insecticides," gives a current picture of findings and the thinking of research men on this extremely important topic:

Conclusions.—1. Intensive selection and inbreeding resulting from exposure of adults and larvae to some toxicants produces resistant strains of flies.

2. Generally, the increase in tolerance is slow during the first several generations and then increases rapidly when resistance becomes definitely established.

3. Flies highly resistant to one toxicant become resistant to others more readily than susceptible strains.

4. Under pressure of some insecticide, resistance will rise sufficiently to maintain the species in equilibrium with its environment.

5. In the absence of insecticides, DDT house fly strains of low or high resistance tend to retain their resistance at a constant level for as many as thirty generations.

6. Highly resistant strains of flies show significant changes in tolerance to other insecticides. Some changes are specific while others appear non-specific in nature.

7. Toxicants of mixed composition do not produce tolerance changes as readily as pure compounds.

8. Multiple tolerant strains of house flies can be produced by exposing the methoxychlor strain of larvae and adults to mixtures of chlorinated hydrocarbons.

9. Resistant inheritance factors are carried by both sexes. Crosses result in physiological blends of resistant characters which, in the absence of DDT, persist through as many as fifteen generations of inbreeding without measurable changes. Resistance appears to be an indifferent genetical change.

10. House fly resistance to DDT on Illinois farms has attained sufficient magnitude to suggest the discontinuance of DDT treatments for fly control.

11. More vigilance is needed in determining the onset of resistance to other insecticides. The recommendations should be changed before the tolerance to a toxicant exceeds that of four to eight times normal.

In a discussion period which followed, the point was brought out that in working with DDT-resistant strains of flies some reports indicate control for a week or so, after which the control lapses. The explanation was advanced that the control obtained is based on the effect of the initial application as a space spray, and that there is none of the residual control originally associated with DDT use. The concensus of many participating in the discussion was that this might well foreshadow a return to much wider use of space sprays, with the emphasis on use of a mixture of a number of toxicants such as DDT, BHC, chlordane, pyre-

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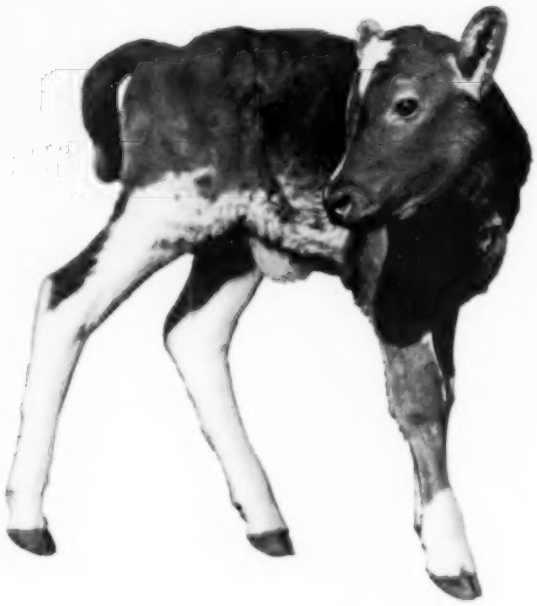

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thrum, toxaphene, etc., to assure that flies which have developed resistance to one or more of the toxicants will still be killed by the others.

The opinion was also expressed that there may be an expanded future for larvacides for fly control, particularly where the flies are of the resistant varieties. One explanation advanced for the development of resistance was that the larvae in manure piles may receive sublethal dosages of insecticide, leading to a rapid build up of resistant strains. With larvae of resistant strains more and more difficult to kill, the opinion was expressed that even more emphasis may have to be placed on sanitation around breeding areas and the use of effective larvacides.

Application Equipment

EQUIPMENT for insecticide application was considered at another session, the same morning, presided over by James L. Brann of Cornell University, in the absence of Cameron Siddal, president of the Texas Entomological Society. Among the speakers were: Earl D. Anderson, secretary, National Sprayer and Duster Association, Chicago, who reviewed "Recent Developments and Trends in the Use of Light Insecticide Equipment"; H. G. Ingerson, John Bean Div., Food Machinery and Chemical Corp., Lansing, Mich., "New Types of Spraying and Dusting Equipment That Will Be Used in 1950"; and Kenneth Messenger, B.E.P.Q., U.S.D.A., Washington, "Shall We Design or Select Our Pest Control Equipment?"

Mr. Ingerson, who is a member of the Industrial Committee on Pesticides and Application Equipment showed a motion picture to give action studies of the newest types of insecticide application equipment. Oscillating spray guns are replacing spray masts, he reported, the advantage being less trouble with overhanging branches. On row crops the latest trend is toward the use of extremely long, hydraulically-controlled hinged booms (giving a spray swath of 42 feet) to reduce wheel damage to the crop. The two sections of the boom may be raised or lowered independently, to fit the contour of the land and assure uniform spray coverage. The trend toward use of automatic equipment will progress further in 1950, the speaker predicted, making the applicator's work easier and assuring a better job. He also anticipates a continued swing toward the use of mist sprayers, applying semi-concentrate and concentrate materials. (Mr. Ingerson has contributed an article on the subject of insecticide application equipment which will appear in an early issue of *Agricultural Chemicals*.—Ed. Note.)

Mr. Messenger noted with concern the inadequate attention given to research on equipment as contrasted with insecticides. Two approaches to the problem are possible,—develop new equipment or improve performance of the old. New insecticides pose new equipment problems, he reminded. As an example, a change in grasshopper baits from

sticky pastes to dry powders raised such an equipment problem, solved by a change in the design of airplane application devices. Mr. Messenger commented particularly on the wide lack of knowledge, both among government officials and those in the industry, as to what types of equipment are available. Often, he observed, the exact type equipment that may be needed to solve a particular problem may be available commercially, but through failure of equipment manufacturers to publicize their developments widely enough, the man who faces the specific problem may not know that such equipment is available.

A new high clearance ground machine developed in Maryland for spraying corn was described in a paper by Ernest N. Cory, George S. Langford, and J. R. Foster, University of Maryland. (See page 63 for photo and description.) Another experimental sprayer-duster for row crops was described in a paper by N. C. Hayslip and J. W. Randolph of the Florida Experiment Station, Belle Glade, Fla.

After a brief discussion it was voted by the membership to add announcements on new equipment and methods for dispersal of insecticides to this part of next year's program.

New Insecticides

REPORTS on test work with a number of new insecticides were presented at the final session, the afternoon of December 16. Dr. J. G. Sanders of Commercial Solvents Corp., New York, discussed "Two New Nitroparaffin Insecticides," one based on propane, and the other on butane, known as 645A and 674A, respectively. They are said to have shown outstanding insecticidal promise, particularly because of their toxicity even at high dilutions to all stages of the Mexican bean beetle.

W. W. Stanley of the Tennessee Agr. Experiment Station followed with another paper discussing test work with the same two products. He concluded the new nitroparaffins show definite possibilities for controlling many common pests such as plum curculio, oriental fruit moth, peach catfacing insects, Mexican bean beetle, pickle worm, tobacco horn worm, leaf-hoppers, certain aphids, cabbage worms, cucumber beetles and others. As the producer reports that the toxicity of these new materials is only about half that of DDT, and the products are reported effective at high dilutions, it would seem, Mr. Stanley indicated, that the residue problem might well be negligible.

Field plot studies on Compound 118 ("Octalene") were reported in a paper by Carl A. Bauer and Paul A. Dahm, Kansas State College. Orthoptera and most Coleoptera were especially well controlled by the sprays (0.5 lbs. per acre). Soil insect populations were reported drastically reduced by the soil treatment (100 lbs. per acre). Production of legume root nodules was not inhibited, and no off-flavor was apparent in any of the plants grown even in the heavily treated soil.

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Entomology and Plant Quarantine, Washington, summarized preliminary results of the bureau in testing the insecticidal efficiency of the newly developed synthetic pyrethrin-like materials against various insects. While earlier test results had indicated a high order of toxicity against the house fly, later tests using the Peet-Grady method, rather than the turntable method, indicate no particular superiority in the synthetic materials over natural pyrethrum. Subsequent tests of both materials against the American cockroach show natural pyrethrum to be two to five times as toxic as the synthetic. Approximately the same degree of toxicity was exhibited against the yellow fever mosquito.

Tests using synergists would seem to indicate that it is not safe to assume that comparable results will be obtained with synthetic and natural products. A number of synergists like piperonyl butoxide are comparatively ineffective when used with the synthetic materials, while at least one synergist seems to give a satisfactory improvement in toxicity. Further test work needs to be done along this line, Dr. Bishopp indicated.

Preliminary tests on acute toxicity of the synthetic to rats suggests that it is even less toxic than the natural, which itself exhibits an extremely low order of toxicity.

Preliminary tests with the new synthetic for agricultural use against a number of common pests, he indicated, look most encouraging. The synthetic, has shown up very well in preliminary work against the army worm, the celery leaf tier, pea aphid, and the two spotted mite. The new material, incidentally, seems to be more effective as a dust than as a spray.

Dr. Joseph B. Moore of McLaughlin Gormley King Co., Minneapolis, also read a paper discussing "Relative Toxicity to Insects of Natural Pyrethrins and Synthetic Allyl Analog of Cinerin I." Dr. Moore's research disclosed that the synthetic material is equally or possibly even more effective than natural pyrethrins on flies, but that on roaches and other field insects, when used in concentrations normally recommended with natural pyrethrins, the synthetic is less toxic. Dr. Moore reported favorably upon the effectiveness of N-2 ethyl hexyl imide of endomethylene tetra hydro phthalic acid ("264" a product of Van Dyk & Co.) and two homologues thereof as synergists for the synthetic allyl homolog of Cinerin I, particularly for the control of roaches. This synergist, plus the synthetic allyl homolog of Cinerin I shows considerable promise also for the control of other insects such as stored grain insects, flies and others.

Report Tests of CPR

A SUMMARY of test work with CPR, a product of U. S. Industrial Chemicals, Inc., containing piperonyl cyclonene, pyrethrins and rotenone was presented by Dr. L. C. McAlister, Jr. of U.S.I. The CPR insecticides have the particular ad-

vantage of being free from normal toxicological hazards to warm-blooded animals and may be used on the edible portions of vegetables safely throughout the entire growing and harvesting periods. They have proved to be particularly effective against a wide variety of insects attacking vegetable crops such as: the Mexican bean beetle, the green clover worm, cabbage worms and loopers, asparagus beetles, flea beetles, the Colorado potato beetle, the beet webworm, leaf tiers, and certain other leaf eating insects.

Citrus Pests

PAPERS on citrus pests and their control were numerous in the list of convention papers. The effect of insecticides on biological control of insect pests of citrus was the topic of Paul DeBach and R. R. Bartlett, University of California, Riverside. They reported numerous instances of adverse effects on natural enemies of various citrus pests which accompanied use of insecticides. Intelligent integration of insecticide spray programs with increased biological control knowledge, they believe to be one solution to the problem.

Reviewing studies of new insecticides for the control of citrus thrips, W. H. Ewart, University of California, Riverside, reported that field studies show that DDT, DDD, parathion, compound 118 and compound 497 were more effective against citrus thrips, *Scirtothrips citri* (Moult.), than methoxychlor or toxaphene while chlordane and lindane were ineffective under the conditions used. Formulations of ground sabadilla seeds combined with sugar in bait sprays show promising control. Ground sabadilla seeds formulated with lime were less effective than other sabadilla formulations.

Mixtures With Fertilizers

IN a group of miscellaneous papers several were concerned with mixtures of various insecticides with fertilizer. W. W. Stanley of Tennessee Agricultural Experiment Station, Knoxville, for example, reported that five pounds of 10% gamma BHC per acre, applied with fertilizer as a carrier, has given practical control of green June beetle larvae in newly seeded pasture fields.

W. H. Thames, Jr., Everglades Experiment Station, Belle Glade, Fla., reported that parathion, compound 118, lindane and chlordane applied as wettable powders mixed with fertilizer at rates of five and three pounds per acre gave effective control of wireworms on sugarcane, with highly significant increase in stand over untreated plots.

Two papers by Stanley D. Beck, University of Wisconsin, and G. S. Kido, Wisconsin Alumni Research Foundation, Madison, dealt with the toxic action and the insecticidal possibilities of Antimycin A. Mr. Kido reported that the material has shown a high degree of toxicity in minute quantities against several species of insects and mites. Mr. Beck reported that this antibiotic is very toxic to insects when injected into the body.

Insects on Ornamentals

A REPORT on field experiments with various insecticides for the control of insects attacking ornamentals was offered by Theodore W. Kerr, Jr., Rhode Island Agr. Experiment Station, Kingston, R. I. Work at this station indicated that DDT and lindane were superior to nicotine sulfate for control of the oak lace bug; nicotine sulfate and BHC were effective, while DDT and chlordane were ineffective for control of the wooly beech aphide; and DDT was superior to chlordane for control of the holly leaf miner.

L. C. Kuitert of the Florida Agr. Experiment Station, Gainesville, reported that recent experiments have shown parathion to be effective in controlling armored and soft scales, mealybugs, white flies, aphids, thrips and lacebugs infesting woody ornamentals. Parathion was found to show several advantages over oil emulsions: it can be used during hot weather, can be applied to tender foliage and is more effective against many of these pests.

Control of Ticks

REPORTING on experiments with control of ticks on dairy cattle using DDT, BHC, lindane, methoxy-DDT, chlordane, toxaphene, DFDT, pyrenone and combinations of these materials, D. E. Howell, Oklahoma A. & M. College, Stillwater, Okla., observed that BHC and lindane provided the quickest kill, but a mixture of BHC and toxaphene gave the most economical control in the field.

SYSTEMIC INSECTICIDE

(*Continued from Page 29*)

Toxicological and pharmacological work revealed that the mammalian toxicity is similar to that of parathion, but is slightly less. Analysis of sprayed plots has shown that no toxic residue whatsoever can be detected at harvest if crops have been sprayed up to six weeks beforehand. In feeding trials under the same circumstances, no toxic effect to mammals could be found. Although nearly 2,000 acres were sprayed this year no ill-effects to humans were observed. All operatives were under continuous medical supervision and were protected from spray drift by protective cabs on the tractors.

All sprayed crops were analysed before harvesting commenced and in no case was any trace of octa methyl pyro phosphoramide found. A sensitive method for the determination of this chemical in plant material has been worked out.

The chemical is now available in the United States for experimental purposes. A radio active isomer was produced using P.32 and is now available to research workers also.

It is hoped that other investigators will give octa methyl pyro phosphoramide the attention which it seems to merit because, having combined selective and systemic action it is the first practical insecticide which enables the entomologist to supplement biological control by chemical means.

LITERATURE

HOSKINS W. M. BOYCE A. M. and LAMINAN J. F. The use of selenium in sprays for the control of mites of citrus and grapes. *Hilgardia* 12 115 (1938).

NEISWANDER C. R. and MORRIS V. H. Introduction of selenium into plant tissues as a toxicant for insects and mites. *Journal of Economic Entomology* 33 517, (1940).

SMITH H. S. Racial Segregation in new populations and its significance in applied entomology. *Journal of Economic Entomology* 34 1, (1941).

RIPPER W. E. Biological Control as a supplement to chemical control of insect pests. *Nature* 153 448, (1944).

MARTIN H. and SHAW H. Developments in method and materials for the control of plant pests and diseases in Germany. *Rept. No. 1095* . British Intelligence Objective Sub-Committee (London 1948).

SCHRADER G. *Rept. No. 714* B.I.O.S. (1948).

GREENSLADE R. M. Pestox III: A systemic Insecticide. *The Grower* December 11, 1948.

RIPPER W. E., GREENSLADE R. M. and LICKERISH L. A., Combined chemical and biological control of insects by means of a systemic insecticide. *Nature* 163 787 (1949).

BENNETT S. H. Preliminary experiments with systemic insecticides. *Br. Ass. Appl. Biol.* 36: 160-163 (1949).

DAVID W. A. L. and KILBY B .A. Preparation and insecticidal action of bis (bis dimethylamino phosponous) anhydride. *Nature* 164 522 (1949).

RIPPER W. E. A new systemic insecticide. *Bull. Ent. Research* 40 4 (1949).

FERTILIZER

(*Continued from Page 24*)

should raise its sights and lead rather than just move along with agricultural progress. Be that as it may, since the turn of the century the industry has made technological advances which have gone far in lifting it out of the "scavenger" category to one of the largest and most important units of the modern chemical industry. Its nearly a billion dollar plant conducts about 600 million dollars in business annually. Many in the industry are becoming aware of the contributions which plant nutrients make to the maintenance and improvement of the health and vigor of the Nation through foods of higher nutritive quality produced on fertilized soil. Such awareness is bound to have a beneficial influence on the public relations outlook of the industry and correspondingly on the attitude of the public toward the policies and practices of the industry.

Higher Analyses

ALONG about 1900, mixed fertilizers and materials then common in the industry, were of low analysis. Chemically processed materials except superphosphate and sulfate of ammonia were virtually unknown, and the cost per unit of plant food to the farmer was high. A typical complete fertilizer of 1900 had an average of about 13 per cent total plant nutrients made up of about 2 per cent nitrogen, 9 per cent phosphoric acid and 2 per cent potash. Now, with the old processes improved and new products of much higher plant food content and better physical condition developed, the average complete fertilizer of today contains 22 per cent plant nutrients. These comprise about 4 per cent nitrogen, 11 per cent phosphoric acid

and 7 per cent potash. Meanwhile, the cost of plant food to the farmer has been sharply reduced. These favorable results were the product of the combined research of government and private organizations.

Research has also resulted in the acceptance of new methods of applying fertilizers to render them more readily accessible to plant roots. Greatly improved fertilizer drills and distributing machines of special design contribute now to the more efficient utilization of plant food.

Aims and Purposes

NOW, what of the future? Can we outline briefly what are the aims of the industry? I believe we can. The goal of the fertilizer industry is not hard to define. It is this: to promote the use of fertilizer as a tool for the maintenance of a permanent and productive agriculture so that one generation may pass on to the next, soils that are in at least as high, but preferably a higher level of productivity, than they were before. Fertilizers are more important to farmers in every country than they ever were before. World needs of food and fiber require maximum production on every acre of tillable soil. Without fertilizer in adequate amounts it is not possible, regardless of good husbandry practices, to get maximum acre yields and the highest output per man.

Fertilizer makes possible an economy in land use while insuring greater yields on whatever land it is applied. It is a well-proven fact that fertilizer increases production per unit of land area relatively much more than the additional labor required to apply it. Briefly, the use of fertilizer produces higher crop yields of better nutritional quality, encourages better land use and increases labor efficiency. These benefits are generally recognized and undoubtedly are the reasons why consumption of fertilizer in this country has jumped from about one million tons in 1880 to almost 19 million tons last year, and why the Food and Agriculture Organization of the United Nations is taking such an active interest in teaching other countries how to use fertilizer to increase yields.

Certainly tomorrow's fertilizer processes and products will be superior to those of today. Research in the laboratories of government and private industry will bring about changes not foreseeable at present. We have scarcely begun to make full use of the fertilizer tools already developed by recent research. The hampering restrictions of tradition and habit put up hurdles to what we think and do. As soil science develops, adjustments will be forced upon us and will help overcome the inertia of history and habit which are ever present as a challenge to those who press forward with new and better ways and products. Tradition and habit can be as formidable obstacles to scientific advances as the technical problems of soil science, fertilizer manufacture, chemistry and chemical engineering.

Let us renew our faith in the scientific method, welcome change, and push forward confidently into Tomorrow!

Industry Patents

2,486,688. Method of Deodorizing Benzene Hexachloride. Patent issued November 1, to Howeth J. Thomas, Oakland, Raymond M. Stager, Albany and Horace R. McCombie, Oakland, California, assignors to Shell Development Co., San Francisco.

1. The method of deodorizing benzene hexachloride said method comprising mixing benzene hexachloride in a liquid hydrocarbon bath boiling between 110 and 400° C., and then heating the benzene hexachloride-containing bath at a temperature between 80 and 150° C., but below the boiling point of the bath, until evolution of acrid vapors from the bath is complete.

2,487,533. Mixer for dry and wet ingredients. Patent issued November 8, to Harold G. Eastman, Arlington, Tex., assignor of one-half to Roland Turck, Arlington, and one-half to Stewart W. De Vore, Tarrant County, Texas.

1. A mixing machine comprising in combination, a horizontal mixing chamber, a driven impeller within the said chamber, a housing above the said chamber, a driven conveyor within the said housing, an opening between the said housing and the said chamber near one end of the latter, an inlet in the upper surface of the said housing opposite the said chamber opening, a vertical chute above and opening into the said housing inlet, a gate pivotally supported within the said vertical chute, a nozzle within the said chamber and near the said chamber opening, a pipe connected with the said nozzle, a valve connected with the said pipe for regulating the said nozzle, a bell crank secured to the said gate, a linking arm connecting the said bell crank with the said valve, and an outlet in the said chamber remote from the said chamber opening.

2,488,089. Spray Gun Attachment. Patent issued November 15, to Charles W. Mayo, Toledo, Ohio, assignor to the De Vilbiss Co., Toledo. In an attachment of the type described, a hollow body with two closely positioned openings in its bottom wall, a pair of downwardly diverging tubular legs connected to said openings, a hollow nipple extending upwardly from the top of the body, and an upright blade-thin tongue extending from between said openings and the bottom wall of the hollow body up through the body and nipple and to a point substantially above the upper end of the nipple, said tongue diametrically partitioning the interior of the body and the nipple in a vertical plane passing between the two openings in the bottom wall of the body.

2,488,554. Aircraft Liquid Sprayer. Patent issued November 22, to Lee A. Otterson, Willows, Calif. A spraying device mountable on an airplane, comprising a liquid container including a removable wall member, a centrifugal pump and distributor assembly and means for removably mounting it on the container against said wall member to facilitate removal therefrom for inspection and repair of both the container and the assembly, said assembly including a tubular member and means rotatably mounting it, said tubular member being at one end in communication with the container and provided at the other end with outwardly extending hollow members arranged for distributing liquid in a fine spray drawn through the tubular member, and means secured to the pump and distributor assembly for actuating it by the slipstream of the airplane during flight.

2,488,663. Applicator for Insecticides. Patent issued November 22, to Edwin C. Graff and Frederick H. Miller, Papa, Calif. (Miller assignor to Graff). A device for applying liquid insecticide to roosts or the like which comprises a reservoir for liquid, a valve controlling flow of liquid from the reservoir, guide means engageable with a roost to position the valve over the roost, and means connecting the valve and guide means to open the valve when the guide means contacts the roost and close the valve when the guide means is out of contact with the roost.

2,488,776. Means for Fumigating with Pesticidal Compounds. Patent issued November 22, to Elwyn Jones, Ardrossan, and John Stocks Flanders, West Kilbride, Scotland, assignors to Imperial Chemical Industries, Ltd., Great Britain. A fumigating device which comprises a safety fuse having a combustible core and at least one textile covering surrounding said core, one such covering having a thermally vaporizable pesticidal compound intimately associated therewith, each textile covering being permeable to the gaseous combustion products of said core and said compound being substantially nonvolatile at ordinary temperatures.

2,489,531. Alkyl-Naphthyl Ethers as Insecticides. Patent issued November 29, to Theodore W. Kerr, Jr., Seymour, and Walter D. Harris, Naugatuck, Conn., assignors to United States Rubber Co., New York. An insecticidal composition comprising an alkyl 2-naphthyl ether in which the alkyl radical contains four to eight carbon atoms, and a surface-active dispersing agent.

2,489,532. Alkenyl Naphthyl Ethers as Insecticides. Patent issued November 29, to Theodore W. Kerr, Jr., Seymour and Walter D. Harris, Naugatuck, Conn., assignors to United States Rubber Co., New York. An insecticdal composition comprising an alkenyl naphthyl ether of the group consisting of allyl and methallyl naphthyl ethers, and a surface-active dispersing agent.

Trade Mark Applications

PYFOS, in bold capital letters, for miticide and insecticide. Filed July 2, 1948, by Woolfolk Chemical Works, Ltd., Ft. Valley, Ga. Claims use since March, 1948.

CHEVRON, in sans serif capital letters, for insecticides. Filed Dec. 20, 1947, by Standard Oil Company of California, San Francisco. Claims use since Feb. 26, 1942.

GY-TOL, in thin letters, caps and lower case, for insecticides. Filed April 9, 1948, by Geigy Company, Inc., New York. Claims use since March 19, 1948.

WEEDONE, in hand-lettered capitals, for chemical preparations for exterminating weeds. Filed April 17, 1948, by American Chemical Paint Co., Ambler, Pa. Claims use since Feb. 15, 1948.

FLIGHT BRAND, letters inscribed on poster motif, showing airplane applying pesticide to crop, for agricultural insecticides and fungicides. Filed July 6, 1948, by Carolina Chemicals, Inc., Leesville, S. C. Claims use since Feb. 28, 1948.

GRUBEX, in Chelt, capital letters, for liquid spray or dip concentrate preparation for application to livestock for destroying cattle grubs and ox warbles or wolves, and for controlling lice, mites and ticks. Filed Dec. 20, 1948, by Florida Chemical Industries, Inc., Ocala, Fla. Claims use since Oct. 11, 1948.

PENTECH, in block capital letters, for insecticides. Filed Apr. 2, 1948, by Pennsylvania Salt Manufacturing Co., Philadelphia. Claims use since Feb. 3, 1948.

HOOKER CHEMICALS, in capital letters within box drawn in perspective, for benzene hexachloride, paradichlorobenzene and other chemical products. Filed Apr. 29, 1948, by Hooker Electrochemical Co., Niagara Falls, N. Y. Claims use of mark as described since July 1, 1944; and since November 1906, of the name "Hooker."

SPROUT-LOK, in capital letters, for chemical composition for inhibiting the sprouting of potatoes, tubers, carrots, beets, and other root crops. Filed July 29, 1948, by Barrett Fisher, doing business under the firm name and style of Westville Laboratories, Stepney, Conn. Claims use since April 2, 1948.

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Prof. Fitzpatrick Dies

Prof. H. M. Fitzpatrick, 63, of the Dept. of Plant Pathology, Cornell University, Ithaca, N. Y., died December 8 at his home. He had been connected with Cornell for the past 31 years, as a student then as an instructor.

Classified Advertising

Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. Address all replies to Classified Advertisements with Box Number, care of AGRICULTURAL CHEMICALS, 254 W. 31st St., New York 1. Closing date: 25th of preceding month.

Positions Wanted

Export Manager for Europe & South America: Swiss engineer, 38 specialists for organic insecticides, fungicides and other agricultural chemicals, 15 years research and sales experience, completely grounded in agricultural and industrial markets, excellent governmental and business contacts, speaks four languages fluently, seeks responsible position with American chemical company. Will accept position in USA, South America or West Europe. Address Box 408 care of Agricultural Chemicals.

Production Supervisor: College graduate with 8 years experience in a wide variety of insecticides desires a permanent position with an aggressive organization in the insecticide field. Address Box 409, care of Agricultural Chemicals.

Aggressive Sales Executive: 20 years productive marketing insecticide experience major agricultural areas. Seeks managerial position providing opportunity expansion your business this important market. Address Box 410 care of Agricultural Chemicals.

Sales Representative: West Coast man with 20 years experience in sale of insecticides, fungicides and allied chemical specialties open for position to represent manufacturer and cover entire western territory. Knows the field, buyers, and is well-known. Impressive sales record. For further details, write to Box No. 411 care of Agricultural Chemicals.

Agricultural Chemicals Technologist: With more than 12 years of laboratory, field and administrative experience in research development and testing of insecticides, herbicides, and related products. Have worked on all major groups and am acquainted with testing control problems and with industrial and official personnel throughout the United States. Familiar with manufacturing distribution and marketing operations and requirements. Address Box No. 412 care of Agricultural Chemicals.

Miscellaneous

Close Out Sale: Naco Root Dusters. Complete with motors and all accessories; 9 x B4's $159. ea; 3—ZA8's $309.ea; 1—ZA2, $315. 6—ZA1's $312. ea; also 4—YB4's, complete except motor $149.50 ea; also several power take off packages and accessory packages, above all new, mostly packed in original crates. FOB Aurora Warehouse Inc., Aurora, Oregon.

Shade Tree Conference

The fifth annual meeting of the Midwestern Chapter of the National Shade Tree Conference will be held February 15-16-17, 1950, at the La Salle Hotel, Chicago, Ill., according to N. B. Wysong, secretary.

Registration will begin at 12:00 noon Wednesday, February 15, with the first paper on the program being presented promptly at 2:00 P.M. A short discussion period will follow the presentation of each paper, and additional opportunity for questions and discussion will be provided in the Plant Forum session. Officers for the ensuing year will be selected at the business session Thursday afternoon. Members of the National Arborist Association, Inc. will hold a luncheon meeting Thursday noon.

The program includes a number of papers on agricultural chemicals. L. L. Coulter, Dow Chemical Co. will discuss "New Herbicides and Their Use": "New Insecticides," will be presented by H. M. Harris, Iowa State College, Ames; "Effective Fungicides," by J. C. Carter, Natural History Survey, Urbana, Ill.; and a panel on "Organic vs Inorganic Fertilizers in Tree Feeding." Taking part in this will be Paul Pfund, Elmhurst, Ill.; R. Milton Carleton, Chicago, and L. C. Chadwick, Ohio State University, Columbus.

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FERTILIZER PLANT

(*Continued from Page 35*)

stituting new services to its customers, either. It has recently acquired the services of H. A. McGee, formerly head of the tobacco extension work at the South Carolina Agricultural Experiment Station, to go about the area to represent the company as a special tobacco consultant. Since a large portion of the plant's customers are tobacco growers, this addition to the staff has made a big hit, Mr. Brown says.

A new 4-8-12 low-chlorine, low-sulphur, slow-leaching nitrogen fertilizer for sandy land has been evolved by Mr. McGee for tobacco crops, and reports say that this mixture is working out with great satisfaction. Another popular fertilizer is a 3-12-12 mixture for local pasture use. The product contains urea nitrogen and cottonseed meal, with 35% of its nitrogen water insoluble. It is thus resistant to leaching.

Pasture fertilization, by the way, is heralded as "the coming thing" in the South. Manager Brown points out

that with relatively fewer acres in cotton, due to federal restrictions, more interest is being shown in improved grasslands. And this means the use of generous applications of fertilizer, the value of which the farmers are learning more and more to appreciate. Typically southern, the area served by this plant produces cotton, corn, tobacco and small grains as well as vegetables.

The Southern Cotton Oil Co. notes with pride that its fertilizer products were used to produce the world's record yield of 8,000 pounds of lint cotton on 5 acres, which amounts to three bales per acre. This is, of course, far and away above the average of a half to three-quarters of a bale per acre. The company also co-sponsors an attempted record yield for corn in South Carolina, which resulted in 162 bushels per acre on a five acre plot. This record is said to be the highest in the southeast, and is particularly outstanding in view of the state average of 25 bushels per acre.

Although the Florence plant of the S.C.O. Co. has been making fertilizer for many years; the new setup is virtually a completely new unit from one end to the other. The plant is roughly in an "L" shape, with the stem portion representing the 500-ft. wooden building with overhead conveyer belts carrying the raw materials to the mixers and bagging machines along its length. At the far end, five large doors allow trucks to back to the building's side for loading, and a platform lines up with freight cars on the Atlantic Coast Line RR. siding which runs parallel to the building.

Work on the new structure was begun in February, 1949, and in August, production began on a reduced scale. By November, however, full scale production got under way with the official opening being attended by some 600 guests who went through the plant during its "open house". The event was an old-fashioned fish fry, with townspeople and farmers from miles around taking part in the festivities.

Advertisers' Index

(The Advertisers' Index has been carefully checked but no responsibility can be assumed for any omission.)

TALE ENDS

THE recent meeting of the American Association of Economic Entomologists at Tampa, Fla., holds a considerable contrast to reports of the original meeting of "The Association of Official Entomologists" in 1889. This organization meeting was held at Toronto, Canada on August 30, 1889, on a wooded knoll at Scarborough Heights. On this site, overlooking Lake Erie, Professor Cook presided at the meeting sitting astride a fallen log. Dr. John B. Smith took the minutes of the session while perched on top of a tall stump, and the remainder of the attendants reclined on the ground or sat cross-legged upon convenient ant hills. (according to the story)

That the A.A.E.E. has come a long, long way in the intervening years, is too obvious to mention. Its influence in scientific thought has been considerable, and its contributions to agriculture through control of insect pests have been great.

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Christmas Greeting cards by the scores were received from all parts of the country by the *Agricultural Chemicals* staff during the past few weeks. Much as we'd wish to acknowledge these personally and individually, this is physically impossible. So here's a big thanks from all of us to each of you who remembered us during the holiday season!

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Manufacturers of agricultural fumigants are probably not greatly worried about reports coming from South America which tell of a commercial application of a "death ray" used to fumigate grain.

Using this method, according to *C-I-L Agricultural News*, it is possible to kill insect larvae and eggs in stored grain in 30 seconds whereas it required 24 hours to do the same job with the same quantity of grain, using toxic gases. With the FDA hearings much in the consciousness of the trade, we can't help wondering if the "death ray" leaves a residue in the grain.

"...great expectations..."

Matt: Now, hold on there, Hank. I remember it was only last June you said you were going to get 85 bushels per acre out of that corn field of yours.

Hank: Sure, my yield was way below expectations.

Bill: 'Course Hank, we're just as guilty as you are. We didn't heed the warnings any more than you about the borer coming to live with us.

Hank: Maybe so, but I don't like offering excuses and there wouldn't be any call for them if I'd completely followed recommendations. I got the planting date right, plowed clean and so on.

Matt: I know you did but—

Hank: But that wasn't enough. Why, I went to bed one night sure it was my big year and the next morning the borer was everywhere short of my back door.

Learned my lesson, though. This year I'm starting right off watching for the borer with plenty of DDT spray ready.

Got great expectations for this year.

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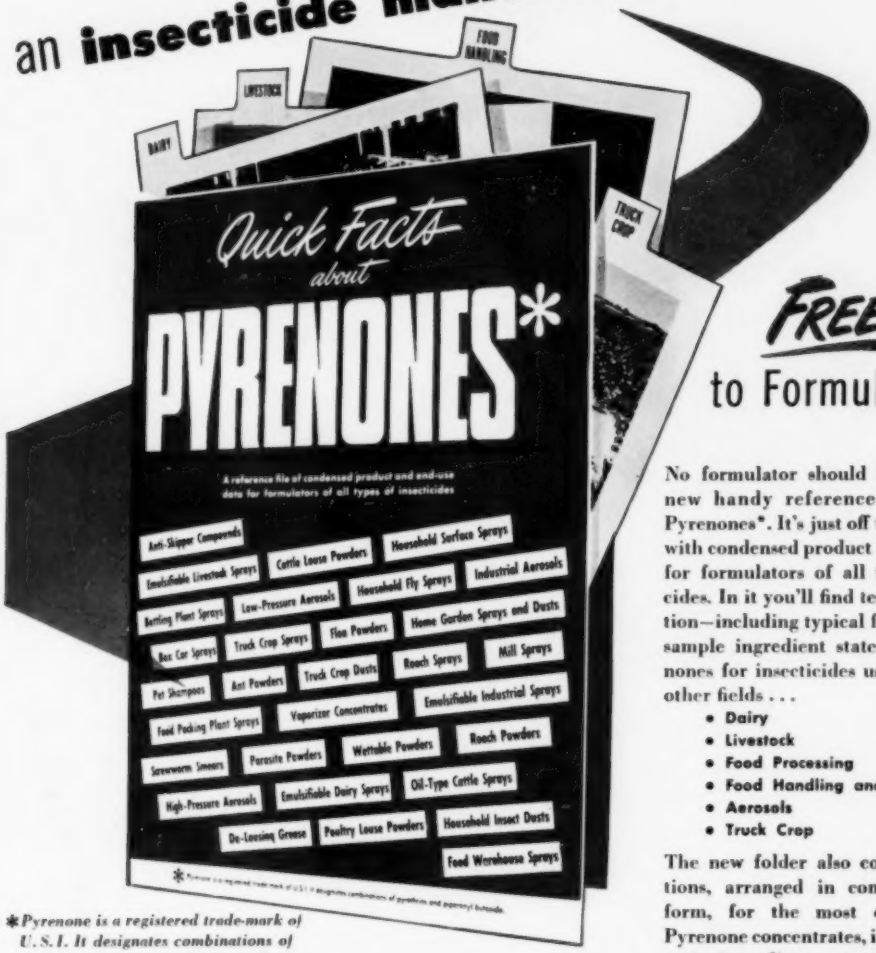

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